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ABSTRACT

The socioeconomic rationale of higher education provision in developing countries is examined by a review of the costs and benefits associated with investment in higher education as a whole and especially in different postsecondary subjects. University expenditures in developing countries typically account for less than 20 percent of the state budget for education, and an increasing part of this expenditure is devoted to technical and vocational subjects. This is indicated by the rising relative share of university enrollments in engineering, agriculture, and related fields of specialization. The international trend toward technical subjects is thought to reflect the notion that technical education contributes to economic development. The scientific basis of this notion is examined by examining criteria for social choice in education: efficiency, equity, employment effects, social demand satisfaction, and flexibility benefits. Assessment of higher education costs at the aggregate university level and the subject field level permit an analysis of the behavior of unit costs as enrollment rises and documents cost differences between various university departments. The quantitative side of higher education benefits is analyzed, including the earning advantage of the graduates of different subjects, social demand satisfaction, income distribution, and employment prospects. Nonquantitative aspects of the choice between liberal and vocational education are addressed by reference to curriculum theory and the sociology of knowledge and change. The results suggest that technical and general curriculum have their place in a balanced educational system. A bibliography and data for different countries are appended. (SW)

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HIGHER EDUCATION IN DEVELOPING COUNTRIES: A COST - BENEFIT ANALYSIS

The purpose of this paper is to take a close look at the socio-economic rationale of higher education provision in developing countries. This is done by reviewing the costs and benefits associated with investment in higher education as a whole and especially in different post-secondary subjects. University costs, and in particular benefits, are treated here in their broadest sense to arrive at the true contribution of higher education to the standard of living of the present and future generations. This socio-economic evaluation of the higher education subsector is performed by reference to a multi-country, multi-period data set, which has been augmented by nonquantitative considerations.

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George Psacharopoulos

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SECTION I

INTRODUCTION AND SUMMARY

1.1 Higher education, the very top step of the learning ladder, sometimes finds itself at the bottom of the hierarchy when considering priorities in educational spending. The recent common prescription for economic development is injections of basic and especially vocational education. After all, it is extremely difficult to rationalize expenditure on another university when a high proportion of the country's population is illiterate.

1.2 Given this setting, the purpose of this paper is to take a close look at the socioeconomic rationale of higher education provision in developing countries. This is done by reviewing the costs and benefits associated with investment in higher education as a whole and especially in different post-secondary subjects. University costs, and in particular benefits, are treated here in their broadest sense to arrive at the true contribution of higher education to the standard of living of the present and future generations. This socioeconomic evaluation of the higher education subsector is performed by reference to a multi-country, multi-period data set, which has been augmented by nonquantitative considerations.

Paper Outline

1.3 Beyond this introduction, the paper contains eight additional sections and an Appendix. Section II documents some recent trends in the allocation of education budgets around the world that are of interest to the subject matter of this study and serves as the starting point of the remaining argument. Section III is normative, in the sense of spelling out the criteria of social choice in education. The set of usual criteria is expanded to include the satisfaction of social demand for education and career flexibility because of rapid technological change.

1.4 Higher education costs are tackled at two levels. First, at the aggregate university level (Section IV) and disaggregated by field of study (Section V). These two sections permit an analysis of the behavior of unit costs as enrollment rises and also document cost differences between various university faculties.

1.5 Section VI deals with the quantitative side of higher education benefits, such as the earning advantage of the graduates of different subjects, social demand satisfaction, income distribution and employment prospects. The purpose of Section VII is to bring together the costs and benefits documented above in order to answer the question: how does the economic payoff of expenditure on university education compare with that of other sectors in a variety of country settings? Also, how do the different fields of university specialization compare in terms of net economic rewards?

C

1.6 Section VIII expands the line of argument to include non-quantitative aspects of the choice between liberal and vocational education by reference to curriculum theory and the sociology of knowledge and change. The final section (Section IX) makes some concluding remarks regarding the applicability of a "vocational school fallacy" in developing countries.

1.7 The Appendix contains a long list of digested raw material that served as the basis of this study.

Synopsis of the Major Points

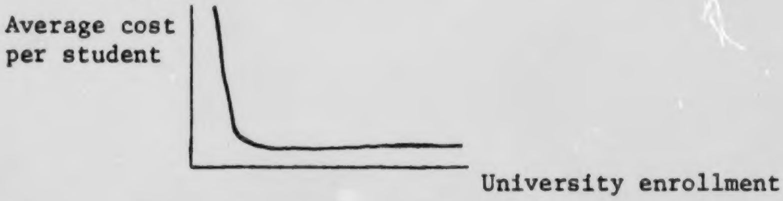
1.8 University expenditures in developing countries typically account for less than 20% of the state budget for education. An increasing part of this expenditure is devoted to technical and vocational subjects. This is evidenced by the rising relative share of university enrollments in engineering, agriculture and related fields of specialization. The trend towards technical and vocational subjects is also reflected in the educational lending priorities of the World Bank. Consider, for example, the switch in the percentage distribution of loans by curriculum type between the 1960s and the late 1970s:

	1963-69	1970-74	1976	1979
General Subjects [1/]	44	42	40	24
Technical and Agricultural Subjects	44	45	47	58

The main reason advanced to explain the world wide trend towards technical subjects is the intuitive notion that it is technical education that contributes to economic development.

1.9 We start examining the scientific basis of this notion by laying down criteria for social choice in education. The usual social efficiency (i.e. economic growth) and income distribution criteria are augmented by equity considerations such as the satisfaction of social demand for education, the employability of graduates and, more importantly, their adaptability to a continuously changing economic and social environment and their potential of learning on the job. Part of these evaluation criteria could be given a quantitative content, e.g., one can assess the extent to which the provision of a particular kind of education affects social efficiency.

1.10 An anatomy of university costs at the aggregate level reveals the existence of considerable returns to scale. Namely, the per student unit cost decreases as university enrollment rises, especially up to the point corresponding to a 3% enrollment ratio.



[1/] As defined by the World Bank.

1.11 The implication of this finding for countries with a low level of university enrollment is that tertiary education expansion could be achieved by a lower level of expenditure relative to the one anticipated on the basis of the current nominal average cost per student.

1.12 But there exist wide differences in educational costs depending on the curriculum type: university subjects such as agriculture, sciences and engineering are on the average more than twice as expensive relative to general subjects. As shown below, agricultural subjects are on top of the relative expensiveness index:

(Cost of all higher education subjects = 100)

Agriculture	191
Sciences	125
Engineering	111
Arts	73
Humanities	67
Social Sciences	50

1.13 Turning to university benefits we first approximate them by the relative earnings advantage of graduates of various disciplines. The earnings discrepancies shown below are not as wide as the cost discrepancies between subjects. But agriculture is now in the bottom of the earnings league:

(Earnings of all higher education graduates = 100)

Engineering	106
Social Sciences	104
Arts	94
Sciences	88
Agriculture	87

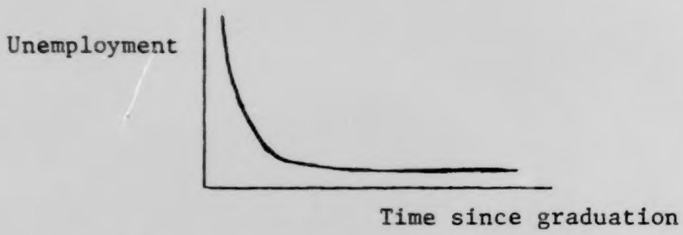
This earnings structure is not fully attributable to public sector salary scales.

1.14 Comparison of the costs and benefits yields an economic return of about 15% for higher education as a whole (developing countries' average). This compares favorably to the economic returns in a selection of physical capital projects. The economic return on higher education expenditure is at least as competitive as that of other sectors in most country settings.

1.15 Disaggregation of the economic returns by field of specialization (as shown below) reveals the low position of agriculture relative to some other fields:

Economics	15.0%
Sciences	14.2%
Humanities	14.0%
Agriculture	8.0%

1.16 Turning to the job prospects of higher education graduates, a distinction is made between the incidence and the duration of unemployment. On the incidence issue, it is secondary school graduates who exhibit the highest unemployment rate. Contrary to the popular belief, the statistics demonstrate that the incidence of unemployment among university graduates is more or less equal to the average unemployment rate for the working population as a whole. On the duration issue, the evidence points to the fact that unemployment is a sharply declining function of age or time since graduation:



What this means is that a great part of what appears to be unemployment might in fact be a voluntary search process.

Qualifications

1.17 In interpreting the conclusions of this study, one should bear in mind the following qualifications: first, the sample of countries is extremely small, although these are the very countries for which at least some evidence exists on this research front. Second, most case studies refer to urban populations and there must exist considerable within-country regional differences in the variables examined. Third, one must place greater confidence on the cost relative to the benefits evidence, since a great part of the latter is based on public sector employment. It is hoped that future tracer studies and within-country cost analyses will throw additional light on some of the hypotheses put forward in this paper. Fourth, the documented low position of agriculture in the subject benefit-cost league might be downward biased because of the difficulty in quantifying the research output of agricultural faculties.

1.18 The fact that the available evidence points to the existence of returns to scale from university expansion and high benefit-cost ratios of non-vocational subjects should not be interpreted as an advocated policy switch from basic to higher education, or from engineering and agronomy to liberal arts. Rather the results contained in this paper should, at the very least, serve as a reminder that technical and general curricula have their place in the development of a balanced educational system.

SECTION II

CURRENT BUDGETARY ALLOCATION TRENDS

2.1 Education is a major resource user. According to Unesco estimates, the total public world expenditure on education in the mid-1970s was of the order of 300 billion US dollars (Unesco, 1977, Table 17). Taking into account private expenditure and the foregone earnings of those in school, the true resource cost of education should be well above double this figure. It is the sheer absolute size of the education expenditure that compels an "economic" look at the way this money is spent. Of course the economic look does not deny a more academic, cultural or other approach to education. It simply complements it.

2.2 In this section we present some facts on current trends in the allocation of education budgets around the world. This first section is "positive" in the sense of not asking the question of how good or bad the trends are. The "normative" check is relegated to a later part of this paper, after some evaluation criteria have been spelled out in Section III.

2.3 Although impressive, the absolute figure mentioned above is meaningless unless related to a common benchmark or disaggregated by education or country type. The common benchmarks are the country's per capita income, gross domestic product or total state budget. The disaggregation usually refers to a country's level of economic development, the level of education the expenditure refers to, or the between-subject division of, say, higher education. Although the focus of the paper is this last division, we present other figures as well by way of introduction.

The Between Country Type Distinction

2.4 Table 2.1 shows two dramatic differences between more and less developed regions in the distribution of public educational expenditure. The first difference refers to the fact that 90% of the world expenditure in education takes place in advanced countries. The true resource share of education in advanced countries must be even higher, when the differential opportunity cost of schooling is taken into account. The second point to note is the similarity in the percentage of GNP spent on education between country groups (see last column of Table 2.1). When expressed in relative terms, the 10% expenditure share of developing countries amounts to 3.9% of their GNP, whereas the corresponding figure in advanced countries is 5.7%. Clearly, developing countries put nearly as much effort as advanced countries into financing their educational systems.

Table 2.1: PUBLIC EXPENDITURE ON EDUCATION BY REGION AND AS A PERCENTAGE OF GROSS NATIONAL PRODUCT (1974)

Region	Percent of World Education Expenditure	Percent of Gross National Product
North America	35	6.6
Europe	47	5.4
Africa	2	4.2
Latin America	4	4.3
Asia	10	4.0
Oceania	2	6.3
Developed Countries	90	5.7
Developing Countries	10	3.9
World	100	5.5

Source: Unesco (1977), Table 17.

The Between Educational Level Distinction

2.5 Table 2.2 presents the typical education budget allocation in a few developing countries. Although there exists wide variation between individual countries, primary education in developing countries typically absorbs about 40% to 50% of the education budget, whereas the shares of secondary and higher education are about one-quarter and one-fifth, respectively.

2.6 This allocation pattern is the end result of the interplay between high enrollments and low unit cost of the primary level on the one hand, and low enrollments and high unit cost at the university level on the other hand.

Table 2.2: THE ALLOCATION OF PUBLIC RECURRENT EXPENDITURE BY LEVEL OF EDUCATION (percentage)

Country	Educational Level: Primary	Secondary	Higher
Syria	39	25	26
Senegal	46	34	20
Mexico	51	26	12
Colombia	44	22	11
Ethiopia	44	31	14
Tanzania	43	19	10

Note: Percentages do not add to 100 because of expenditure on "other types" of education.
Source: World Bank (1980).

The Field of Study Distinction

2.7 Published statistics on expenditure by field of study are extremely scarce because the accounting of the spending unit (say, the university) is performed at the global level, many departments sharing overhead costs (such as administration and libraries). In a later section of this paper we will present a compilation of micro cost statistics at the individual department or school level.

2.8 It is sufficient to present here some indirect evidence on the allocation of funds by field of study, simply by looking at enrollment data in these fields. Table 2.3 shows the percentage of university enrollments by field of study in an international cross-section. This table reveals a striking similarity in the share of enrollments in different fields of study around the world.

2.9 This might be the result of a deliberate developing countries' policy of a 6-to-4 bias in favor of scientific and technical subjects, implemented by a series of incentives (such as grants and bursaries) to attract students in such faculties. This policy was first officially proposed and accepted by African governments at the first ministerial level meeting held in Tananarive in 1962 (see the resulting Conference Report, Unesco, 1963).

Table 2.3: THE DISTRIBUTION OF UNIVERSITY ENROLLMENT
BY FIELD OF STUDY, MID-1970S
(percentage)

Subject	Developed Countries	Developing Countries	World
Humanities	17	19	19
Social Sciences	19	19	19
Sciences	10	10	10
Law	6	9	8
Education	15	12	12
Engineering	11	11	11
Agriculture	2	4	4
Medicine	12	9	10

Note: "World" includes oil-producing countries. Figures do not add vertically to 100 because of "other" subject categories.

Source: Based on the "international cross-section sample," Appendix A.

Over Time Allocation Trends

2.10 Table 2.4 shows time trends in the allocation of educational budgets by country type at five-year intervals. The percentage of GNP spent on education has increased steadily, although developing countries are lagging behind the world average both in terms of level and growth of expenditure. The fact that educational expenditure in developing countries is not growing as fast as in advanced countries is more clearly shown in the second panel of Table 2.4.

2.11 The third panel of the same table shows the share of the educational budget spent on university education. Although this share has slightly increased between 1970 and 1975, it still remains below one-fifth of the public recurrent budget. Paradoxically, there are no differences in this statistic between developed and developing country groups. 1/

Table 2.4: TIME TRENDS IN EDUCATIONAL BUDGETS

	1960	1965	1970	1975
GNP spent on education				
World (percent)	3.8	4.9	5.4	5.5
Developing Countries	2.3	3.0	3.4	3.9
Public expenditure on education index,				
World (1960 = 100)	100	140	200	320
Developing Countries	100	120	160	290
Higher education share of the budget,				
World (percent)			13	18

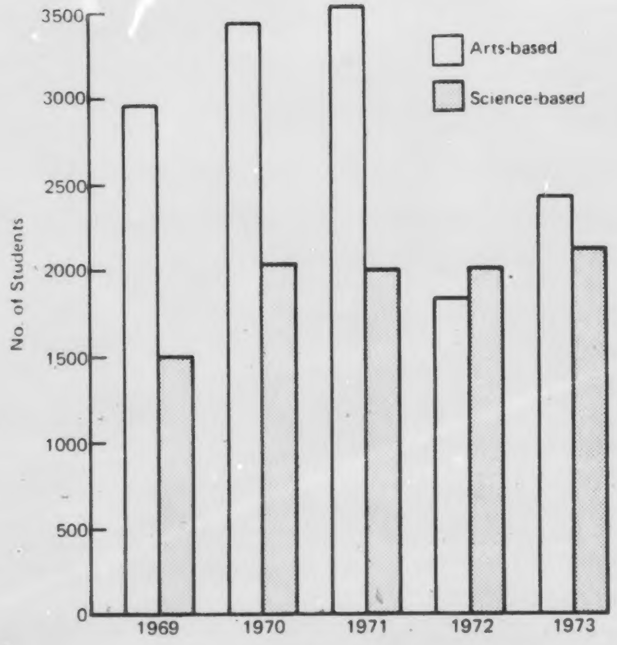
Note: Lower panel based on "international cross-section sample," Appendix A.

Source: Top two panels based on Unesco (1977), Tables 17 and 18.

1/ For a related analysis see Lee and Psacharopoulos (1979).

2.12 These world averages might in fact conceal the actual trend within individual countries. As an example, Figure 2.1 shows the evolution of composition of enrollments in one African country (Sudan). The clear trend shown is that of an over time squeeze of arts-based general faculties in favor of a simultaneous expansion of technically oriented sciences. (see Appendix Table F.8). The Sudan is not a unique case in this respect. As shown in Table 2.5 enrollments in vocational university faculties in East Africa, such as agriculture and engineering, have grown much faster than in general faculties.

FIGURE 2.1 The Time Trend of University Intake by Subject in the Sudan, 1969–73



Source: Sanyal and Yacoub (1975), p. 79

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Table 2.5: ENROLLMENT OF TANZANIANS AT THE UNIVERSITY OF EAST AFRICA BY SUBJECT, 1965 AND 1975

Faculty	1965	1975	Growth index (1965 = 100)
Agriculture	18	293	1628
Engineering	63	234	371
B.Sc. (General)	48	119	248
Law	61	107	175

Source: Sanyal et al. (1977), p. 104.

2.13 And it is not only at the tertiary level that the vocational-technical bias has been at its forte. The "sixth-form," i.e. the last year of secondary schools feeding the universities in the British-based educational systems, has been science-biased as well. As an example, consider the case of Tanzania (Table 2.6) where the share of enrollment in arts subjects in the sixth-form has gradually trickled down from about 50 per cent in 1961 to nearly one-quarter in 1975.

Table 2.6: THE CHANGING COMPOSITION OF ARTS VERSUS SCIENCE IN THE SIXTH-FORM, TANZANIA

Year	Arts as percentage of total enrollment
1961	47
1970	39
1975	26

Source: Appendix Table F.9

2.14 Cases such as the ones documented above are typical of what has been happening around the developing world since the early 1960s based on an intuitive imitation of the Western "techno-structure" for accelerated economic growth.

The World Bank Lever

2.15 Although the allocation of the education budget is a given country's decision, the World Bank lending policy might have an indirect effect on the way educational funds are spent in some developing countries. The reason is that a Bank decision to, say, provide a loan for the construction of a technical rather than a general secondary school in country X, later entails a higher budgetary recurrent expenditure for technical education.

2.16 Table 2.7 presents the distribution of World Bank education lending by level and curriculum type. Although the numbers fluctuate a lot because of particular loans in particular years (right four columns), one general trend is an increase in the share of loans towards technical and agricultural curricula. Whereas in the mid-1960s general and vocational curricula had an equal share in the composition of educational loans, the balance had been heavily tipped to the technical side by the late 1970s.

Table 2.7: DISTRIBUTION OF WORLD BANK LENDING BY LEVEL OF EDUCATION AND CURRICULUM TYPE
(percentage)

Educational Level or Curriculum Type	1963-69	1970-74	1975-78	1976	1977	1978	1979
Primary	-	5	14	14	18	12	15
Secondary	84	50	42	48	41	32	38
Higher	12	40	27	23	19	44	37
General and Comprehensive a/	44	42	34	40	24	25	24
Technical and Agricultural	44	45	53	47	50	60	58

Note: Percentages do not add up to 100 because of the exclusion of nonformal education and other curricula types.

a/ Curriculum split up, as defined by the World Bank.

Source: Education Department, World Bank.

2.17 Could it be that the World Bank's education lending policy tacitly supports the view that it is engineering and technical education that contribute to economic development? 1/ In the affirmative case one has to question the scientific base of this common view, a subject to be discussed later in this paper.

1/ At least this has been the stated objective of the 1974 Education Sector Paper: "In the future ... a decrease for ... higher education is projected. Lending for general education ... will decline and support for technical education ... will remain ..." See World Bank (1974), p. 59.

SECTION III

THE CRITERIA OF SOCIAL CHOICE IN EDUCATION

3.1 In the previous section we documented a more or less clear trend away from general and towards technical-vocational subjects at the university and pre-university levels. In order to judge whether this trend is in the desired direction one must spell out normative criteria of choice.

3.2 The traditional economic criteria for evaluating any project that affects the community, are its efficiency, equity and employment effects. However, in the case of university education we must expand this list to include the so-called social demand satisfaction and flexibility benefits. These terms are explained below.

The Social Well-being Function

3.3 To formalize the treatment it is assumed that social well-being (or the prosperity of the nation) is a function of a series of arguments, [1] i.e.

$$\text{Social well-being} = f(X_1, X_2, X_3, X_4, X_5, Z)$$

where X_1 is efficiency
X_2 is equity
X_3 is employment
X_4 is social demand satisfaction
X_5 is flexibility benefits
Z is a set of other unmeasurable arguments.

Any project, educational or other, is bound to affect specific arguments in the right hand side of this function. The questions that arise are:

(a) In what direction is a given effect? (e.g. does it increase or decrease efficiency?). This is a sign problem.

(b) What is the quantitative dimension of the effect? (e.g. does it increase efficiency by a large or by a small amount?). This is a size problem.

(c) How does one treat trade-offs between arguments in the above function? (e.g. when efficiency increases by a large amount but equity diminishes). This is a weighting problem.

---

[1] The term "social well-being" is used instead of the more accepted economic jargon of "social welfare" because of the extended list of arguments in the right hand side and in order to avoid the many connotations "welfare" may have.

3.4 The last problem is at the same time the hardest and easiest to solve; for given the fact that interpersonal comparisons of utility are impossible at least in a scientific way, i.e., what I like might not be what you and others like, the final choice might be done in an arbitrary way by the politicians in power. Thus a conservative party might favor an educational project that increases efficiency at the expense of some equity, whereas a labor party might opt for another project that has the opposite social effects.

3.5 In view of this political normative choice what remains for the analyst is the documentation of the sign and size of a project's partial effects on the different arguments of the social well-being function.

3.6 This is exactly what we try to do in this paper regarding higher education, in general, and the vocational-technical orientation of the curriculum, in particular. In the remainder of this section we shall try to summarize the state of our knowledge in this area and in the following sections we shall bring together additional data to throw light on the issues at stake.

Efficiency

3.7 The term "efficiency" has at least two different meanings when used in education. One meaning refers to the internal efficiency of an educational institution to educate the pupils and turn out its graduates. [1] The other meaning refers to the external efficiency of the institution, e.g. how its graduates fit in the social setting after they leave school, in comparison with the resources used while in school. [2]

3.8 External efficiency is a stricter test than internal efficiency simply because the latter does not necessarily imply the former. For example, a given school might be very efficient at turning out graduates, yet its graduates might not be well rewarded in the labor market, thus not passing the external efficiency test.

3.9 Here we are interested in both the internal and external efficiency of educational establishments. Internal efficiency is usually analyzed by the "cost-effectiveness" technique, whereas external efficiency by the "cost-benefit" technique. The first technique compares differential costs for producing a given output, whereas the second technique pays attention to both costs and the kind of output produced.

3.10 Another distinction regarding external efficiency is that it can be analyzed by means of micro or macro-economic analysis. Micro analysis is performed at the (typical) student or graduate level and takes the form of the "net present value" or the "rate of return" to investment in a given level or kind of educational institution (Psacharopoulos, 1973). Macro analysis on the other hand takes the form of education's contribution to the country's economic growth rate (Denison, 1967). Since macro-efficiency must be founded on micro-efficiency, the emphasis in this paper will be on the latter.

---

[1] The analytical tool for studying internal efficiency is the "educational production function," e.g., see Hanushek (1979).

[2] For the conceptual origins of this approach, see Becker, (1964).

3.11 What do we know of the social efficiency effects of education? Regarding the three main educational levels we know well that the lower levels are much more cost-efficient relative to the higher levels. What is perhaps not so obvious, is the fact that there exist tremendous differences between developed and less developed countries in the relative cost structure: whereas in advanced countries one university student costs 18 times as much as a primary school student, the corresponding figure is 88 in developing countries (see Table 3.1).

Table 3.1: THE RELATIVE SOCIAL COST STRUCTURE BY EDUCATIONAL LEVEL (PRIMARY = 1)

	Country Type		
Educational Level	Developed Countries	Intermediate	Developing Countries
Primary	1	1	1
Secondary	7	7	12
Higher	18	21	88

Source: Blaug (1973), p. 24.

3.12 Of course the differential input structure means little unless one puts a price on the output as well and thus arrives at an external efficiency measure of education. What we know on this front is that the lower levels of education are more efficient relative to the higher levels; and that the economic returns of education are higher in the developing countries group (see Table 3.2).

Table 3.2: THE SOCIAL RETURNS TO EDUCATION BY COUNTRY TYPE (percentage)

Educational Level	World	Developed Countries	Developing Countries
Primary	> 50	a/	> 50
Secondary	14	10	15
Higher	11	9	12

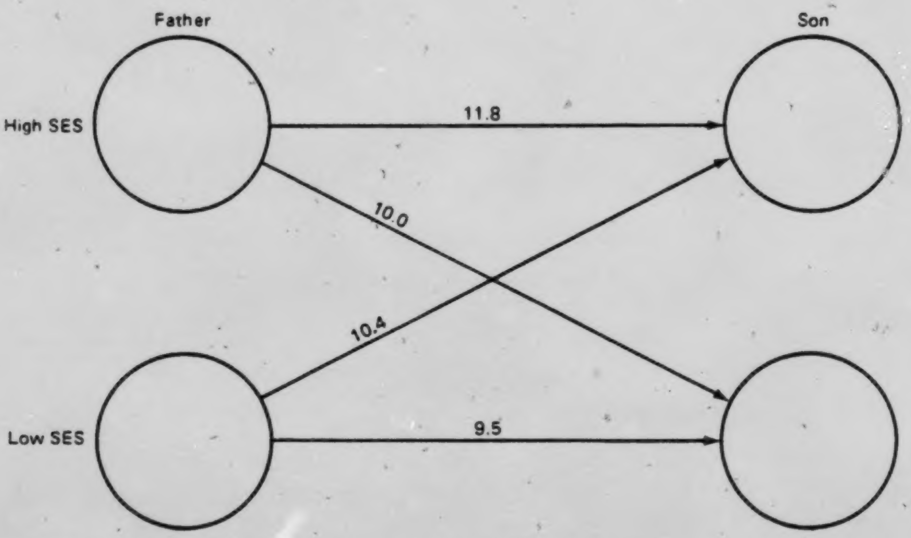
a/ It is difficult to make estimates of the returns to education in advanced countries because of the lack of a control group.

Source: Psacharopoulos, (1973), p. 67.

Equity

3.13 There exist several ways by which the provision of education contributes to equality (or inequality) in a given society. In the first place it affects upward social mobility and hence it helps particular population groups to move occupationally or geographically in the desired direction from the point of view of national well-being. This fact has been well-documented in both industrial and non-industrial countries. Consider as an example the United Kingdom case depicted in Figure 3.1 where upward (or downward) social mobility significantly relates to tiny differences in educational attainment. Also, consider the Ugandan case depicted in Figure 3.2 where educational variables (attainment level and academic performance) are associated with large path coefficients leading to occupational attainment.

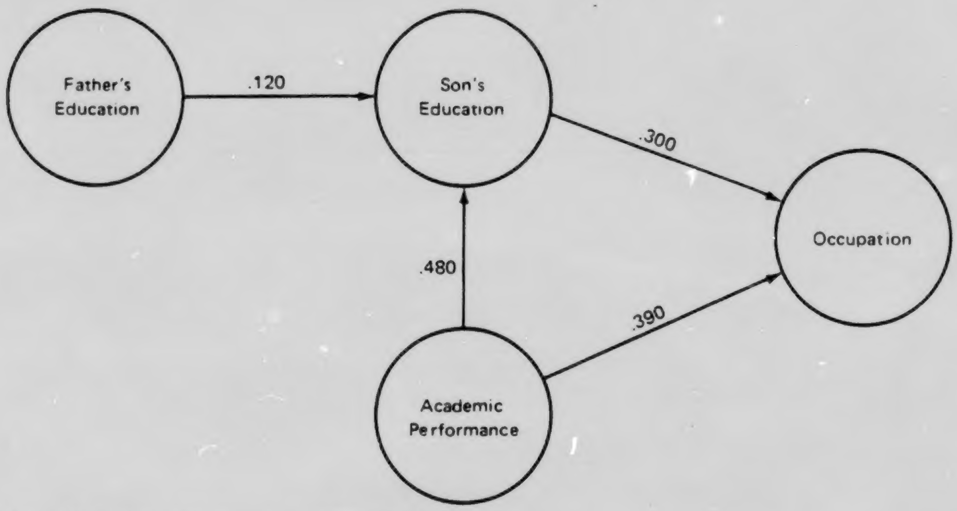
FIGURE 3.1 Social Mobility and Education in the United Kingdom



Note: Numbers on the arrows are mean years of schooling of moving sons

Source: Psacharopoulos (1978), p. 432

FIGURE 3.2 Occupational Attainment and Education in Uganda



Note: Numbers on the arrows are path coefficients

Source: Heyneman and Currie (1979), p. 91, Figure 5

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3.14 The second effect of education on equity is via changes of the earnings structure or the number of people belonging to a given income class. In practically every society in the world there exists a neat stratification of earnings by educational level. As shown in Table 3.3, differences in earnings are more pronounced in developing countries.

Table 3.3: INCOME DIFFERENCES BY EDUCATIONAL LEVEL AND COUNTRY TYPE
(Index, primary = 100)

Educational Level	Developed Countries	Developing Countries
Primary	100	100
Secondary	140	239
Higher	219	639

Source: Psacharopoulos (1975), p. 167.

3.15 What this structure means is that by providing more education to, say, a primary school graduate, this person moves to the secondary school category with higher earnings and hence income distribution changes. The impact of education on income distribution is likely to be stronger in developing countries because of the larger earnings differentials associated with education.

3.16 The impact of education on income distribution has been extensively researched in both the industrial and non-industrial world. Thus, the grand conclusion of Mincer's (1974) work for the United States is that human capital variables account for as much as 50% of the variance of logarithmic earnings (which is a measure of income distribution). This finding has been more or less confirmed in a number of other countries (Psacharopoulos 1977c, and Psacharopoulos and Layard 1979).

3.17 Still another class of analyses relating to the impact of schooling on equity are the ones known as the "Hansen and Weisbrod" (1969) type. These relate the social cost of financing higher education to "who pays for it." Initial analyses have shown that the present system of finance of higher education is inequitable in the sense it results in a net transfer from the poor to the rich. However, this proposition cannot be generalized since in developing countries the direct tax base is relatively small and therefore the Hansen-Weisbrod argument might not apply. Also, later evidence has been rather mixed (see Pechman, 1970 and Jallade, 1974).

Employment

3.18 The employment argument of the social well-being function links directly (or could be relegated) to the efficiency argument, since unemployment is tantamount to inefficiency. However, the tremendous rise of unemployment throughout the world since the early 1970s has lead to the treatment of the employment problem as an issue on its own.

3.19 That education is somehow related to employment is shown in Table 3.4 where one observes a clear bulge of unemployment corresponding to secondary school graduates. There have been attempts to explain this phenomenon either in economic, supply and demand "mismatch"terms or in sociological "aversion for manual work" terms (see ILO, 1971).

Table 3.4: UNEMPLOYMENT RATES BY EDUCATIONAL LEVEL
(percentage)

Country	Illiterates	Primary	Secondary	Higher
Colombia	11.8	15.3	14.9	13.2
Argentina	3.8	4.3	5.7	3.3
Venezuela	4.3	7.0	10.2	2.3
India	1.2	2.7	7.0	2.8
Sri Lanka	7.1	n.a.	11.8	2.3
Malaysia	10.4	19.5	30.9	15.5
Syria	4.3	n.a.	11.7	4.4
Kenya	21.0	21.0	13.0	17.0
Iran	10.0	8.1	13.0	2.6

Source: Psacharopoulos (1975), p. 156.

3.20 But beyond its incidence, unemployment has another important dimension, which is duration. Statistics on this issue and how it relates to education are still very scarce. What seems to be known, however, is that unemployment is heaviest among the young, and that higher education graduates might search for a long period before accepting a job. This behavior has again been explained on economic, private cost-benefit grounds (see Blaug, et al. 1969).

Social Demand

3.21 Education is not only provided for manpower creation. A significant and overlapping component of it takes the form of consumption benefits over the educated person's lifetime. Even in the face of widespread unemployment among graduates, some prospective students might wish to take their chance. Or, some people, especially women, may wish to obtain a given degree although they might have no intention whatsoever of participating in the labor force. This individual pressure is known in the literature as "social demand for education," although in our particular context we may well label it "freedom to choose" for the student and his family.

3.22 Social demand has risen world wide, partly because of rising incomes and expectations. Several governments have been obliged to institute a numerus clausus given their inability to finance an expanded educational system. Table 3.5 shows the degree of difficulty of entering a university in a number of countries. Of course this difficulty is higher the less developed the country.

Table 3.5: UNIVERSITY ENTRANTS AS A PERCENTAGE OF APPLICANTS

Country	Entrance Ratio
Brazil	33
Chile	42
France	61
Great Britain	50
Greece	25
India	34
Iran	15
Israel	72
Japan	24
New Zealand	63
Pakistan	40
Senegal	43
Vietnam	33

Source: Psacharopoulos (1977b), p. 74.

3.23 Social demand satisfaction has been both a substantive problem as well as a modern political goal throughout the world. Since no educational policymaker can ignore this factor, we have elevated it to a separate argument in the social well-being function.

Flexibility

3.24 The world we live in keeps changing at an ever accelerated pace. New machines dethrone old machines and the silicon chip revolution is still underway with yet unpredictable social effects. In view of the uncertainty of future technological change, human resources must be such as to quickly adapt to changed demands. [1] Rigid preparation for a fixed occupational role is a thing of the past. Today, the onus is on the educational system to turn out flexible, adaptable men and women to fit a continuously changing world.

3.25 This is a recurring issue in the literature and there certainly does not exist a generally accepted operational solution on how to achieve this. We shall come back to this issue when discussing the relative merits of different subjects in Section VII. Suffice it to mention here that the degree of an educational policy's contribution to human resources flexibility is a must-item in a country's social well-being function. Of course, "flexibility" might be considered as just the other side of "employability." However, I have chosen to discuss the two concepts separately as to make explicit the importance of career changing possibilities of given higher education subjects.

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[1] For some analytical indications of where the world is heading, see OECD (1979).

SECTION IV

AN ANATOMY OF UNIVERSITY COSTS

4.1 Although educational costs represent only one side of the balance sheet drawn up for making school investment decisions, they are a major item to be considered before any such decision is taken. There exist two main reasons for this. In the first place, the other side of the balance sheet, i.e., the educational benefits, is too elusive and might be altogether neglected. This is serious in itself, but this is how educational policy has proceeded for centuries. To put it in modern terms, the technique of cost-effectiveness analysis is used instead of cost-benefit analysis. Second, every government in the world operates under a budget constraint. Regardless of the size and nature of benefits, an educational project will not be implemented unless the funds exist. Therefore, cost scrutinization and analysis of the true social resource burden associated with school expansion or creation of new facilities is of primordial importance in educational planning.

What Cost?

4.2 The reason the word "true" was underlined in the previous sentence is that there exist several kinds of costs, and one should be extremely careful what cost to use for what purpose. For example, if one is considering the capacity expansion of a particular school, does one look at the average or the marginal cost, the direct or the indirect cost, the accounting or the opportunity cost, the public or the private cost, the ex-post or the ex-ante cost, the fixed or the variable cost? Or, perhaps, some other kind of cost? [1] No one would disagree that costs in educational planning should be reckoned in real rather than nominal terms. However, there are two different (and cumulative) ways one can assess the real cost of education. The obvious one, in tracing cost developments over time, is to correct for inflation. The other one, especially when making cross-country comparisons as those attempted below, is to relate the deflated cost to the particular country's real resources. A US$2,000 cost per university student in a developing country represents a much bigger claim on its resources relative to a similar nominal cost in a developed country. Hence, a per capita income--deflated cost per student might refer to a more demanding concept of "real" cost of higher education and it is in this sense it will be used later in this paper.

4.3 The two key issues we are interested in in this paper are, first, are there returns to scale from university expansion, namely, does the real social cost per student decrease as enrollment increases? Second, are there any significant differences in costs by field of specialization, or, in what subjects could university expansion take place at a minimal cost? In the remainder of this section we shall look at evidence of the returns to scale associated with university expansion. The next section presents evidence on the cost of the university subject mix.

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[1] For theoretical and empirical analyses of educational costs, see Coombs and Hallak (1972); IIEP (1972); Vaizey, et al. (1972); Bottomley (1972); and Verry and Davies (1976).

Returns to Scale From University Expansion

4.4 Evidence on the behavior of unit costs as student numbers in higher education rise can come from two basic sources: first, international cross-sectional data, and, second, within a given country time-series data. Although our main interest is developing countries, cost figures from developed countries have also been included for two reasons. First, on the macro analysis (i.e. returns to scale) developed countries' figures give an order of magnitude of where developing countries head to. Second, on the micro analysis, developing country data might be more reliable on the relative cost structure by subject.

A. International Cross-Section Evidence

4.5 Let us start from the Unesco data. These have the great disadvantage of low comparability across countries because of differential definitions of higher education and coverage (e.g., the cost sometimes refers only to central government expenditure). However, they have the advantage of sample size and are useful at least for establishing world wide patterns.

4.6 On the basis of Unesco's Statistical Yearbook 1977 and earlier years, it was possible to compile cost and higher education enrollment data for 83 countries (see Appendix A). The data mostly refer to year 1975. However, in some cases it was necessary to go back as far as 1970 in order to match enrollment data to cost data. The cost data refer only to recurrent expenditure because the capital expenditure proved too erratic from year to year in order to make possible a meaningful statistical analysis. On the basis of these data the following variables were constructed:

AC, the average cost per student in higher education in US dollars calculated as

$$AC = \frac{(\text{Total education budget in local currency}) \cdot \text{USHARE}}{(E) \cdot \text{Exchange rate}}$$

where USHARE is the share of the education budget spent on tertiary education and E is tertiary level enrollment

$\frac{AC}{Y}$, The "real cost" per student, where Y is the country's per capita income. This variable was constructed in order to obtain a realistic proxy of the true cost per university student relative to the country's resources, and

ER, the tertiary level enrollment ratio.

The total sample of 83 countries has been divided into 58 developing countries, 18 developed countries (as a control group), and 7 oil-producing countries (according to World Bank Tables, 1976).

4.7 Table 4.1 gives a few summary statistics by country group. The average cost per university [1] student appears to be three times as high in developed countries relative to developing countries. However, when one deflates by per capita income, the real (in this sense) cost per student in developing countries is about seven times relative to developed countries.

Table 4.1: COST PER STUDENT AND ENROLLMENT: CROSS-COUNTRY AVERAGES

Country Group	Cost per Student (in US$)	Cost per Student (in per capita income terms)	Enrollment Ratio %	Percentage Spent on University Education	Number of Countries
	AC	AC/Y	ER	USHARE	N
Developed Countries	3449	.8	23.4	17.5	18
Developing Countries	1138	5.6	4.7	14.9	58
Oil-producing Countries	4647	3.1	6.9	20.5	7
All Countries	1935	4.3	9.0	16.0	83

Source: Based on the "International Cross-Section" in Appendix A.

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[1] "Universities" is used here as a shorthand notation for "third level education" to which the Unesco data actually refer.

4.8 There is an important preliminary message coming out of these aggregate international statistics: although it appears that university expansion is associated with increasing unit costs, the opposite is true when the real cost per student is taken into account (see Figure 4.1).

4.9 A look at the scattergram showing the position of individual developing countries reveals a neat L-shaped pattern (see Figure 4.2).

4.10 The apparent existence of returns to scale has been tested by fitting cost functions to different country groups.

4.11 Two basic alternative specifications of cost functions have been used or combinations of them:

$$AC_i = f\ (E_i, Z_i) \text{ and} \tag{4.1}$$

$$\left(\frac{AC}{Y}\right)_i = f\ (ER_i, Z_i) \tag{4.2}$$

where Z_i stands for the i^{th} country's standardizing factors.

FIGURE 4.1 The Behavior of Real Versus Nominal Cost Per Student: The Developing Country Position Compared to Developed Country

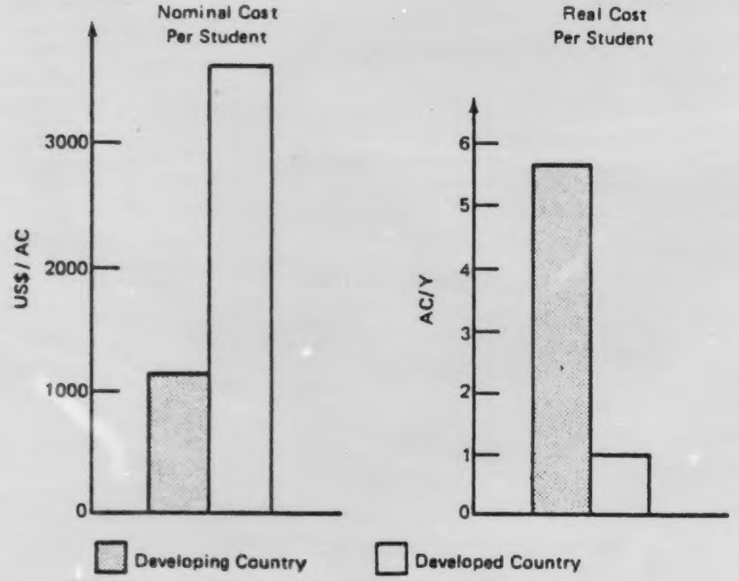

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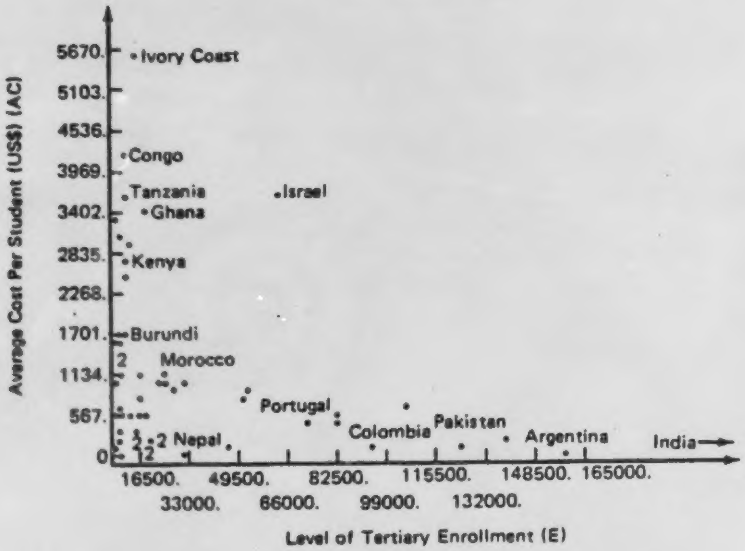
FIGURE 4.2 Average Cost Per Student and Level of Enrollment



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4.12 The first specification above corresponds to the textbook concept of returns to scale (i.e. average cost per student against the scale of enrollments). The second specification is more demanding and perhaps more appropriate to the data used. The "returns to scale" in this case refer to the possible decline of the real cost per student (in per capita income terms) following an increase of the enrollment ratio (rather than absolute enrollment). I consider specification (4.2) to be more sensitive relative to specification (4.1), since countries differ in many respects other than those denoted by Z, and the use of AC/Y and ER provides an effective standardization before the two variables are regressed against each other. Furthermore, it is easier to interpret the results of specification (4.2) for prediction purposes, as done below.

4.13 All specifications gave meaningful and statistically significant results, the details of which are reported in Appendix Tables A.2 and A.3. When all countries were used in the regressions, a DC = 1 dummy (if a country belongs to the developed country group and 0 otherwise) and a Year 1975 = 1 dummy (if the country's data refer to 1975) were included (Column 2). For greater reliability, however, cost functions were fitted strictly within the developing countries' 1975 data group (Columns 3 to 5). Also, total university enrollment was used as an alternative to the university enrollment ratio (Column 3 versus Column 4). And since inspection of the scattergrams revealed a nonlinear relationship between costs and enrollment, enrollment squared (ER^2) and $1/(2.ER)$ terms were introduced in the cost functions for improved statistical fit. The results could be summarized as follows.

4.14 The real cost dependent variable specification (Table A.3) gave much better results than the nominal cost specification (Table A.2). When the real cost function was fitted to the whole sample of countries (Table A.3, Column 2) the enrollment variable had the expected negative sign and was statistically significant at the 99% level of probability. What this means is that the higher the enrollment ratio, the lower the real cost per university student (t - ratio = 3.85).

4.15 The fit improves dramatically by restricting the function to 1975 developing countries' data. The university enrollment ratio alone explains nearly one-third of the variation of the real cost per student (Table A.3, Column 3).

4.16 The use of the hyperbolic specification

$$\frac{AC}{Y} = a + b\,\frac{1}{2\cdot ER}$$

led to an explanation of 45% of the variation of the cost per university student in per capita income terms. Given the nature of the data, this must be considered a surprisingly good fit.

4.17 The use of straight average cost against straight enrollment (E, in thousands), enrollment-squared and per capita income (Y/P, as a crude standardization for the host of "other" factors in which countries differ) gave the following result:

$$AC = 1202 - \underset{(2.17)}{3.5E} + \underset{(2.21)}{1.16}\ (10^{-6})E^2 + \underset{(4.26)}{.742}\ (\frac{Y}{P}),\ R^2 = .212,\ N = 83$$

where enrollment level variable (E) has the expected negative sign and is statistically significant (t - ratios in parenthesis). This empirical result corresponds to a documentation of a textbook case of returns to scale.

A Simulation of the Expected Returns to Scale

4.18 The estimated cost functions have been used to smooth out the scattergrams and simulate the behavior of university costs as enrollment expands. Table 4.2 shows the predicted cost values corresponding to different enrollment ratios. The cost per student in per capita income terms declines dramatically after, say, an enrollment ratio of 2% to 3% and steadies out thereafter (see Figure 4.3). This corresponds to the level of enrollment in countries like Zambia, Congo, Pakistan, Nepal, Mauritius, Morocco, El Salvador and Cambodia. Figure 4.3 portrays a near textbook case of falling average cost. What this means is that university expansion in countries as those listed above is likely to be associated with a much lower unit cost in per capita income terms. It should also be noted that when average cost is falling the marginal cost per student is lower than the average cost. Increasing returns to scale have also been documented in the case of primary and secondary schools (see Chesswas and Hallak, 1972).

Table 4.2: PREDICTED COST PER STUDENT AND ENROLLMENT RATIO IN DEVELOPING COUNTRIES (1975)

Enrollment Ratio (percentage) (1)	Average Cost per Student (in US dollars) (2)	Average Cost per Student in Per Capita Income Terms (3)
1	1995	7.54
2	1703	5.23
3	1440	4.46
4	1207	4.09
5	1004	3.85
6	829	3.69
7	684	3.58
8	569	3.50
9	483	3.44
10	426	3.39
11	399	3.34
12	401	3.31

Source: Column (2), predicted according to Function (5), Table A-2.
Column (3), predicted according to Function (5), Table A-3.

FIGURE 4.3 Average Cost Per Student as a Function of the Enrollment Ratio

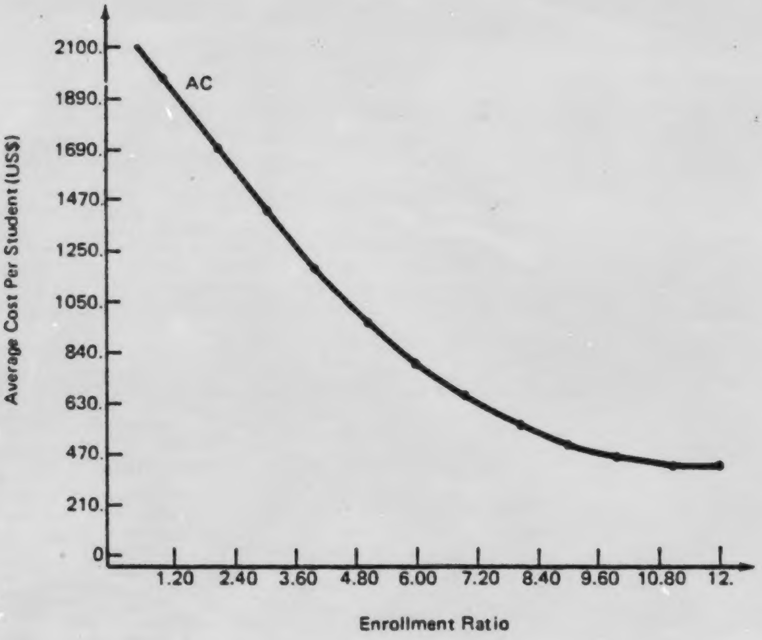

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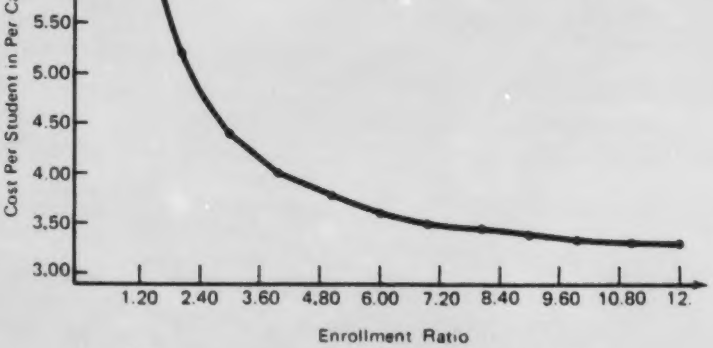
FIGURE 4.4 Real Cost Per Student as a Function of the Enrollment Ratio



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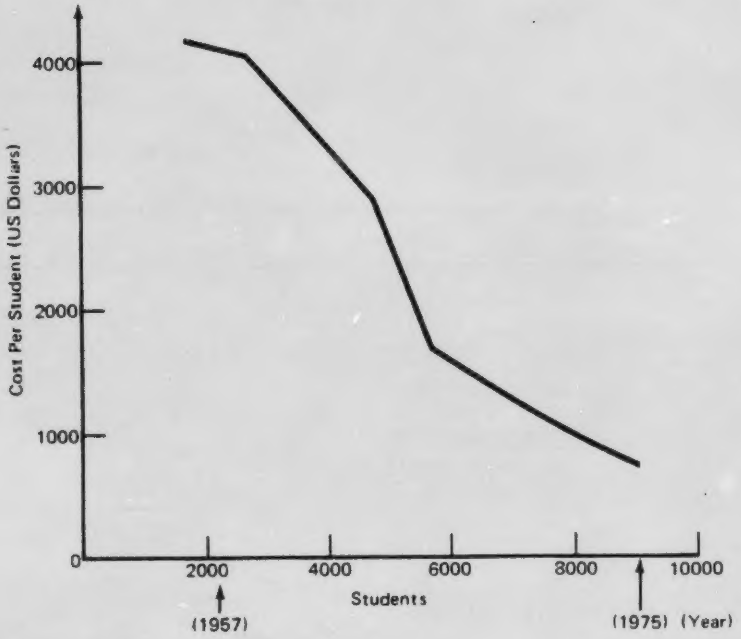
4.19 Several additional experiments were conducted such as excluding from the regressions countries where the educational expenditure refers only to the central government. Also, alternative algebraic specifications were tried of the basic cost function. The results of these experiments, however, were not in any significant way different from those presented above. Therefore, we may conclude this subsection with the following proposition: cross -country evidence points to the existence of substantial reduction in university unit costs as the student body increases.

B. Within Country Evidence

4.20 Another way of documenting returns to scale is by observing the evolution of the cost per student within a given country as university enrollment rises (of course, after correction for inflation). Appendix B presents such time series for nine countries. In spite of cost fluctuation in the case of a few countries, the clear picture that emerges is that of a falling cost per student in constant prices. This is depicted in Figure 4.5 for the case of Ghana.

FIGURE 4.5 The Trend of Cost Per Student in Ghana, 1957–75



Source: Table B.1

4.21 Table 4.3 summarizes the information contained in Appendix B. An annual increment in enrollments of about 12% is associated with a fall of 5% in unit cost. The only two recorded exceptions are minor, and a developed country case (France) confirms the general trend observed in developing countries. 1/

1/ For very detailed returns to scale analyses in the United Kingdom and the United States, see Pickford (1975) and Carnegie Commission (1972).

Table 4.3: AVERAGE ANNUAL CHANGE IN THE REAL COST PER STUDENT AND ENROLLMENT IN SELECTED COUNTRIES (percent)

Country	Period	Enrollment Change	Cost Change
Ghana	1957-75	8.2	- 9.2
Egypt	1957-75	9.5	0.2
Mexico	1961-75	13.0	- 0.8
Thailand	1954-64	6.4	0.1
Kenya	1968-70	20.4	-10.9
Zambia	1969-73	21.5	- 8.6
Pakistan	1964-75	8.4	- 6.3
Average, above countries		+12.5	- 5.1
France	1964-78	+ 6.9	- 2.6

Note: "Real" cost here refers to nominal cost/cost of living index.

Note: Average annual rates of change have been computed on the basis of the two extreme calendar observations.

Source: Appendix B.

4.22 Here is another example from a country at an intermediate level of development. The institution of a number of new universities in Portugal in the early 1970s provides a clinical case of the operation of returns to scale (see Table 4.4). As enrollments multiplied by nearly 15 times in a four year period, the cost per student in real terms dropped to less than one-fifth of its value within this relatively short time span.

Table 4.4: THE OVER TIME EVOLUTION OF THE COST PER STUDENT AT THE "NEW" UNIVERSITIES IN PORTUGAL

Year	Number of Students	Recurrent Cost per Student (in current escudos)	Deflated Cost Index (1975 = 100)
1975	389	323,751	100
1977	2,387	213,612	
1979	5,789	124,115	<19

Source: Appendix Table C.39.

4.23 One word of caution is in order at this point. The documented fall in unit costs might not only reflect returns to scale, but also a fall in the quality of education provided by university institutions. Since some deterioration of quality might accompany rapid university expansion (say, because of a drained pool of good teachers), it would be incorrect to attribute the full cost reduction to returns to scale, especially in countries like Portugal or Egypt. But there exists evidence for advanced countries where one could reasonably argue quality has remained constant while unit costs have decreased. 1/

1/ For example, see the detailed cost analyses conducted at the United Kingdom, University of Bradford, Dunworth and Bottomley (1974). It is reminded, however, that it is extremely difficult to differentiate between quality changes and returns to scale in the general economic literature (see Griliches, 1964).

SECTION V

COSTING THE SUBJECT MIX

5.1 In the previous section we documented the fact that as university enrollment expands the cost per student falls. "Enrollment" in that case referred to the student body as a whole, not differentiated by the field of specialization. The purpose of this section is to go deeper into the analysis of university costs by reference to the subject or faculty mix. Are certain faculties cheaper than others, and if yes, by how much?

5.2 The issue is important for a policymaker who might wish (say, on political grounds) to expand the capacity of higher education based on cost-effectiveness analysis (i.e., without reference to university benefits). Is he going to expand the capacity of the engineering schools or that of social sciences? Knowledge of the relative cost structure will help him to make an informed decision.

Subject Categorization

5.3 Upon embarking on an analysis of this nature it is very tempting to cluster fields of specialization into different groups, such as general versus technical. But whereas this distinction is easy at the secondary educational level it becomes very difficult with reference to higher education. The reason is that a given course of study has many attributes, and many of these atrributes overlap with those of other subjects so as to make a watertight distinction in this respect virtually impossible. Consider for example the "vocationality" of a given subject, i.e. whether it leads to a specific occupation, the degree of "technicality" involved in the training, the use or not of laboratories, the nature of "licensing," if any, after graduation and the possibility of later in life mobility from a non-career-specific education (e.g. liberal arts) to a specific vocation (e.g. para-medical personnel) after following on-the-job training.

5.4 Given this complexity I have chosen to avoid in this paper a strict categorization of subjects and instead present the evidence for individual fields of specialization (but see Bennett, Jr., 1967). After all, the fields for which evidence exists are not that numerous for a summary statistic to be needed. The real issue at stake is the widespread belief that developing countries' enrollments are heavily biased toward subjects like law, humanities and social sciences at the expense of subjects like engineering and agriculture that are allegedly needed for economic development.

The International Cross-section

5.5 The earlier described 83 country cross-section data base was again used to obtain a world pattern of the distribution of university enrollments by field of specialization. Table 5.1 shows the mean percentage distribution of enrollments in eight main faculties within country groups. This table reveals the rather astonishing fact that there are no sharp differences in the share of enrollments by field of study between developed and developing countries. The subjects of social sciences, engineering and sciences account for the same share of the student body in the developed and developing country groups. Law and agriculture enrollments are more heavily represented in developing countries, whereas medicine and education are somehow more pronounced in developed countries.

Table 5.1: DISTRIBUTION OF UNIVERSITY ENROLLMENT BY SUBJECT AND COUNTRY GROUP, INTERNATIONAL CROSS-SECTION (PERCENTAGE)

Subject	Developed Countries	Developing Countries[1]	All[2]
Humanities	17	19	19
Law	6	9	8
Social Sciences	19	19	19
Education	15	12	12
Engineering	11	11	11
Agriculture	2	4	4
Sciences	10	10	10
Medicine	12	9	10

Notes: 1/ Excludes oil-producing countries.
2/ Includes oil-producing countries.
Source: Unesco, International Cross-section (see Appendix A).

Within-country Evidence

5.6 Appendix C contains a compilation of cost data in over thirty countries where a subject differentiation was possible. Most data refer to developing countries, as this is the focus of the paper. However, some developed countries cost cases have been included because of the greater reliability of the figures and also as an indication of the likely future direction of the university cost structure in developing countries.

5.7 Table 5.2 summarizes some of the information contained in Appendix C in the form of relative cost indices by field of specialization. Of course, these indices are highly crude and are offered for the sake of data reduction. But all indices point in one direction. Namely, subjects involving technical laboratories or readily leading to licensed occupations are several times as expensive as non-vocational arts subjects. This proposition is true in developed countries as well as in developing countries.

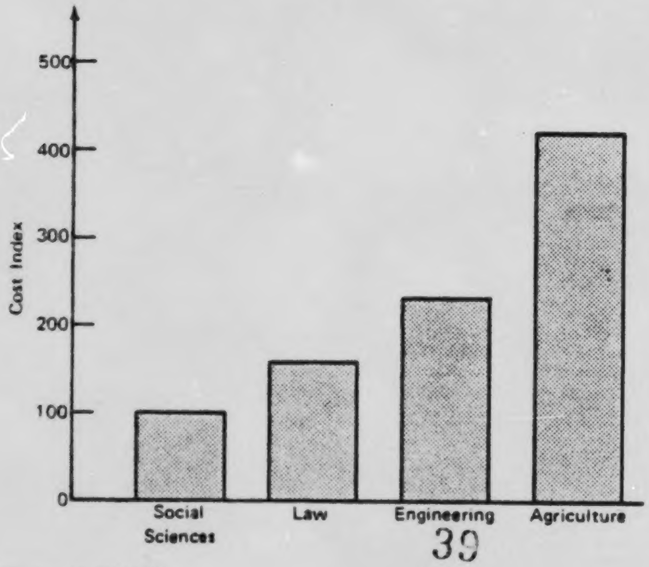
5.8 The corresponding relative cheapness of arts or social sciences applies to both recurrent and capital expenditures (see illustrative examples in Figures 5.1 and 5.2).

Table 5.2: THE HIGHER EDUCATION UNIT COST STRUCTURE BY SUBJECT

Country	Higher Education All Subjects (Index Base)	Agriculture	Engineering	Sciences	Medicine	Architecture	Social Sciences	Humanities	Economics	Arts	Law
Kenya	100	156		115	125		60			60	
Thailand	100	98	93	154	207		22	89		69a/	
Iran	100	183	122	105				46	44		
India	100		123							76b/	
Malaysia	100	127	127		149					85c/	
Zambia	100	142	77		196		67	67			51
Indonesia	100			123						77	
Singapore	100		122			146			62d/		
Norway	100			96	248		42			37	25
France	100		191	116				50	43		43
United Kingdom	100		137	124			61			64	
Developing Countries Average	100	191	111	125	169	146	50	67	53	73	51

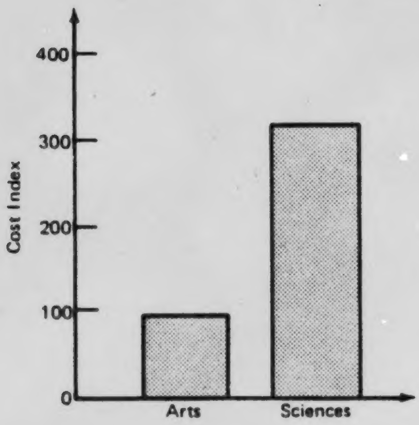
Note: Cost refers to recurrent expenditure unless otherwise indicated.
a/ Refers to fine arts.
b/ Refers to non-engineering bachelor's degrees.
c/ Refers to non-engineering, agricultural or medical students.
Cost includes foregone earnings.
d/ Refers to accountancy.
Source: Appendix C.

FIGURE 5.1 The Relative Recurrent Cost Per Student by Field of Study, Zambia 1973



Source: Table C.13

FIGURE 5.2 The Relative Capital Cost Per Student Place in Asian Countries



Source: Table C.9

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5.9 The reason faculties such as agriculture, engineering and sciences are more expensive than others is the use of costly laboratory space and a lower student-teacher ratio. (For documented examples see Appendix C, especially Tables C.4, C.9 and C.14.)

5.10 The relative expensiveness of the technical curriculum also extends to the secondary level. Table 5.3 contains several country examples where secondary technical education is on the average more than twice as expensive as the secondary general stream. Also, in his study of New York City High Schools, Taussing (1968) documented "the lack of success of vocational training in increasing the market productivity of the graduates, despite the large incremental costs shown to be devoted to vocational training relative to alternative high school programs" (p. 59). The same conclusion was reached by Corazzini (1968) in his analysis of vocational versus general high schools in Worcester, Massachusetts: "The program of vocational education for boys .... was, at best, only marginally profitable" (p. 120).

Table 5.3: THE SECONDARY LEVEL UNIT COST STRUCTURE BY CURRICULUM TYPE

Country	Secondary as a whole	General	Technical
El Salvador	100	77	152
Malaysia	100	n.a.	350
Papua New Guinea	100	n.a.	321
Philippines	100	97	128
Indonesia a/	100	68	132
Honduras	100	20	146
Sierra Leone	100	44	155
Selected Asian countries a/	100	70	130
France	100	93	107
Average, developing countries	100	63	154

Notes: Cost refers to recurrent expenditure unless otherwise indicated.
a/ Refers to capital expenditure.
Source: Appendix C

5.11 One special case worth mentioning is that of non-university post-secondary institutions. As a rule of thumb, these institutions are heavily vocationally-oriented, mostly offer an agricultural curriculum and are very expensive, even when compared with universities. 1/ These institutions are relatively new and not enough data exists to compile for them a table similar to Table 5.2. However, a close examination of the Portuguese case may help demonstrate the point. Table 5.4 shows that non-university status higher education institutions in Portugal have a higher unit cost than most universities in the country, and that this unit cost nearly matches that of the prestigious University of Coimbra.

1/ For example, the cost per student place of the two World Bank-financed National Institutes of Mechanical Engineering in Algeria (Setif and Tiaset) exceeds 30,000 in 1978 US$ (See Table C.24).

Table 5.4: COST PER STUDENT BY UNIVERSITY IN PORTUGAL, 1979

Institution	Recurrent cost per student (in escudos)
University of Coimbra	46,498
University of Lisboa (classical)	26,177
University of Porto	37,637
Technical University of Lisboa	37,505
Non-university higher education a/	42,274

Notes: a/ The Institutions are: Instituto Superior de Engeneria do Porto, Coimbra and Lisboa; Higher Institute of Accounting and Adminstration in Coimbra, Porto, Aveiro and Lisboa; Practical Agricultural School at Sentaria, Evora and Coimbra; Higher Institute of Business Studies.

Source: Appendix C.

5.12 Reference to Table 5.5 shows that these institutions are not only expensive, but also the law of returns to scale operates in reverse with respect to them. A drop in enrollments between 1975 and 1979 in these institutions resulted in a nearly threefold increase in unit costs. Appendix C also gives evidence on the relative cost structure by subject in selected advanced countries. These data permit a finer distinction between marginal cost and average cost by subject.

Table 5.5: ENROLLMENT AND COST PER STUDENT AT THE NON-UNIVERSITY POST-SECONDARY INSTITUTIONS, PORTUGAL

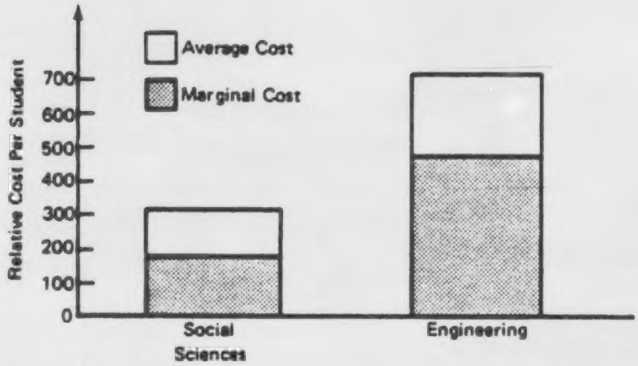
Year	Number of students	Cost per student (in escudos)	Real Cost Index
1975	13,431	5,885	100
1976	12,057	11,802	167
1977	11,664	20,900	238
1978	9,915	30,231	297
1979	8,917	42,274	n.a.

Source: As in Table 5.4.

Some Developed Countries Evidence

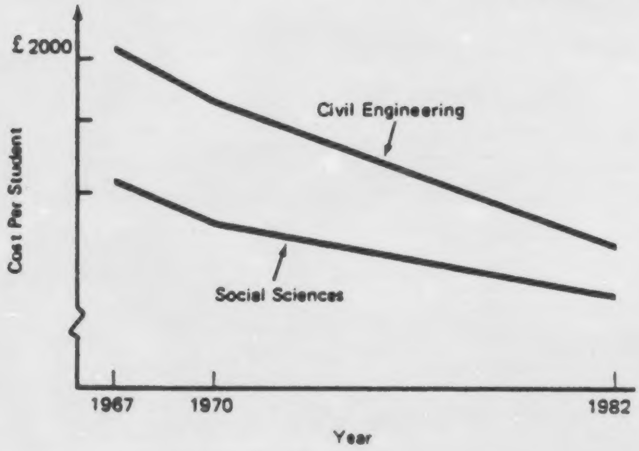
5.13 The developed countries data presented in Appendix C confirm the cost structure revealed in developing countries, namely the cost of science-related subjects is a multiple of arts-related subjects, (e.g. see Tables C.32 and C.37). Marginal cost is lower than average cost, reflecting returns to scale within subject areas (see Table C.5). One result is especially worth pointing at: the cost per student of social sciences is not only lower than, say, engineering, but also its marginal cost is a smaller fraction of average cost (see Figure 5.3), and what is essentially the same thing, the average cost curve drops faster in the case of social sciences relative to engineering (see Figure 5.4).

Figure 5.3 The Relationship Between Average and Marginal Cost Per Student by Subject, United Kingdom 1969



Source: Table C .35

Figure 5.4 The Time Trend of the Cost Per Student for Two Selected Subjects, United Kingdom



Source: Table C .37

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5.14 This section's conclusion is that expansion of university faculties such as social sciences, humanities and arts is considerably cheaper relative to engineering and agriculture. However, this is only one-half of the whole picture, i.e. one must examine university benefits, a subject to which we now turn.

SECTION VI

EVALUATING THE UNIVERSITY BENEFITS

6.1 A university could be described as a multi-product firm. This "firm" produces instruction, research, socialization, certification, and has other myriad social functions. Evaluation of its "output" becomes extremely complex starting from the taxonomic point of view.

6.2 Some of the benefits produced might be private whereas others might be social. Benefits, whether private and/or social, might be overlapping, as in the case of instruction and research. The benefits might directly affect a group of people in society, but there might exist second round (spill-over) indirect effects. Some benefits might be of a short-run character while others might have lasting implications. And a substantial part of benefits might be non-monetary (see Michael, 1981).

6.3 In view of this multiplicity of dimensions, the solution adopted in this paper is to divide the university benefits into two categories: those benefits that are more or less quantifiable, and the rest. Whereas the magnitude of the former could be somehow assessed, the rest would enter the calculus as a qualification. For example, if the instructional output of a university could be assessed at US$50 million, then the total output must be well in excess of this figure when one includes the difficult to quantify research output.

6.4 A quantifiable benefit does not have to be in terms of dollars or rupees. If the provision of 10,000 extra university places will change the employment situation of graduates by 2%, this is another figure that has to enter the quantifiable side of the calculus. The same argument applies to the income distribution effects of university provision.

6.5 In what follows we shall look at two main empirical entities in order to trace out the quantifiable university effects: graduate earnings and employment conditions. This will be done at two levels; first for the university as a whole, and second, by field of specialization.

Why Earnings?

6.6 That one should examine the employment conditions of graduates in assessing the quantitative effects of university education, could be taken for granted. What is less obvious, if not contestable, is the use of graduate earnings.

6.7 There are two main reasons the earnings-evidence has been adopted in this paper. First, it ties nicely and complements the cost evidence presented in the previous section. By comparing costs and benefits one can arrive at a summary measure of the economic efficiency of universities. (This measure will be presented in the next section.) Second, there do not exist many alternatives of how to approximate the elusive university benefits. For example, consider one such alternative, namely how well do universities prepare educated manpower for filling slots in the occupational structure? Following this criterion, one would look for vacancies or surpluses of given skills, something we shall do anyway by examining employment evidence. Or one would look at the "relevance" of the education provided, which is something extremely difficult to measure by objective (i.e. non-opinion) tests as there exists no uniform definition of what it really means.

Do Earnings Reflect Productivity?

6.8 The choice of earnings is of course not free of problems in itself, the major objection being that what people are paid may not necessarily correspond to their true contribution in production. This objection becomes stronger when one considers the fact that the public sector is by far the largest employer of graduates in developing countries, hence salaries are determined institutionally (via the civil service pay scales) rather than being based on economic considerations following the operation of the free market mechanism.

6.9 Although this view sounds plausible, it is not entirely true. In the first place the public sector has to compete with the private sector in the open market for graduates, hence it cannot offer less than the private sector for a graduate of given quality and given job conditions. The public sector could certainly afford to pay more relative to the private sector, at least at the entry point. However, the differential involved cannot be either excessive or last over a long period of time. For sooner or later there will be a crisis of one kind or the market check will eventually operate.

6.10 Consider as an example the evidence presented in Table 6.1. In most cases graduate level salaries have actually declined between the points in time under comparison. Why have not the graduates in these African countries pressed for an increasing earnings differential?

Table 6.1: THE CHANGING RELATIVE EARNINGS OF GRADUATES
IN THE PUBLIC SECTOR
OF SELECTED AFRICAN COUNTRIES

		Graduate Level Salary to	
Country	Period	Per Capita Income	Primary School Graduates
Botswana	1964-74	31.9	10.0
	1974-76	16.7	6.0
Ghana	1967-74	9.5	7.9
	1974-75	11.1	4.8
Kenya	1967-70	25.8	7.0
	1970-74	23.7	6.8
Malawi	1970-71	33.3	11.9
	1975-76	16.7	11.9
Tanzania	1964-65	37.2	8.9
	1970-71	25.8	7.2
Zambia	1970-74	14.1	5.2
	1974-a/	13.3	5.1

a/ Not specified.
Source: Jolly (1977).

6.11 Also, a recent review of productivity differentials related to education concluded as follows: "... the public sector is not a source of upward salary pressures..." (Berry, 1980, p. 65). This can be clearly seen in Appendix I which contains information on earnings by sector of employment in Brazil and Malaysia. University graduates in the private sector are paid higher wages than in the public sector (Tables I.1 to I.3). Also, the returns to education estimated on the basis of public sector earnings are lower relative to the returns estimated on the basis of private sector earnings (see Tables I.4 and I.5). Therefore, the fear of an upward bias of the true returns to education because of the existence of the public sector seems to be exaggerated.

6.12 The possible discrepancy between observed wages and the social product of labor has also been exaggerated. In the first place there is a huge overlap between the private and the social product of education. It is hard to imagine a case in which what accrues to the individual worker is a pure private gain having no social counterpart.

6.13 The objections often refer to problems of measurement. Although it is impossible to have a satisfactory monetization of externalities associated with education, one can certainly qualify his conclusions in a given direction by taking externalities into account. Or one can apply "shadow pricing" in order to measure the true value of different types of labor (Psacharopoulos, 1970). Although it is difficult to shadow-price civil servants, this technique has been extensively applied in agriculture, demonstrating that more educated farmers, other things being equal, produce more rice relative to less educated farmers (e.g. see Wu, 1977).

6.14 Measurement difficulties also exist when assessing the returns to physical capital. Consider, as an example, the sensitivity of the rate of return to investment in a tractor production plant in Yugoslavia (see Appendix Table H.6). An over or underestimation of the benefits side by 10% can result in a rate of return ranging from -4.4% to 27%.

6.15 Sometimes the objections to the social dimension of education take the form of more specific labels such as ability differentials, screening, certification, job competition, bumping, dual labor markets or social class.

6.16 The ability factor was one of the earliest challenges to the approach adopted here. Because those who have more education than others allegedly also have a higher level of ability, wage differentials are not solely due to learning, a great part of them being due to differential ability. This highly intuitive argument combined with some aggregate, cross-tabulation evidence by Becker and Denison resulted in the enthronement of this myth. 1/ However, micro data plus scrutinization of what "ability" really means resulted in the highly counter-intuitive finding that ability differentials do not account for much of the variation in earnings (see Psacharopoulos, 1975 and Griliches, 1979).

1/ For a formal analysis of the screening hypothesis see Arrow (1973). For empirical tests see Layard and Psacharopoulos (1974).

6.17 Then there was the so-called screening, or certification, or sheepskin argument, namely what schools produce is just diplomas helping the holder to get a privately well paid job, although the social payoff of the human investment he has undertaken might be minimal. However, there exist two major objections to this view: first, when one makes the distinction between "initial" and "persistent" screening, it is very hard to find evidence corroborating the latter, namely that employers keep paying wages above the worker's productivity after they have the employee under their observation for some time. [1] Initial screening certainly exists, i.e. employers may hire someone on the basis of his expected productivity given his educational qualifications. But there is nothing wrong with it as, after all, it has an informational social value. In his review Berry (1980) concluded: "For the present one cannot rule out the possibility that the true returns to education in most LDCs are rather little affected by such influences..." (op. cit, p. 77).

6.18 Then there was the job competition model, putting forward another highly intuitive notion, i.e. workers compete for jobs rather than wages and those with more educational qualifications push out from the labor queue the less qualified and get the job. [2] This is certainly true. What I have failed to grasp in this model is why this should be socially wrong. If the more qualified perform better in the job they are in, this is socially healthy. The micro evidence I read tells me the latter is likely to be the case as the more qualified earn more relative to the less qualified, even after one standardizes for occupation.

6.19 Another attack comes from the so-called dual or segmented labor market hypothesis (Gordon, 1972). According to it education helps workers belonging to the "primary segment" of the market (i.e. those in good jobs), but not those in the "secondary segment" (i.e. those with inferior jobs). (For a review, see Cain, 1976.) For several reasons the dual labor market fashion that started in the early 1970s has already faded away, although it is still echoed in some quarters. In the first place, testing it is extremely difficult because the hypothesis has never been stated in a rigorous manner. Second, the definition of the upper or lower segment is a major problem on its own. Where should one draw the dividing line between the two allegedly separate labor markets? Last but not least, empirical attempts to test whatever bits and pieces of the theory are testable have failed to reject the orthodox functioning of labor markets (see Psacharopoulos, 1978, and McNabb and Psacharopoulos, 1980).

6.20 Another commonly held belief is that education serves the maintenance of the status quo from generation to generation (Bowles, 1972). Although this might be true to a large extent, it does not constitute a challenge to the use of earnings as a proxy for productivity. For two interesting recent results show that, first, family background (or social class) has only an indirect effect on earnings and this is via education. The direct effect of social background on earnings is rather weak. Also, it is those who acquire more education that are socially more upwardly mobile (Psacharopoulos, 1977a).

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[1] For a theoretical distinction and an empirical documentation of the "weak" versus the "strong" version of the screening hypothesis see Psacharopoulos, 1980.

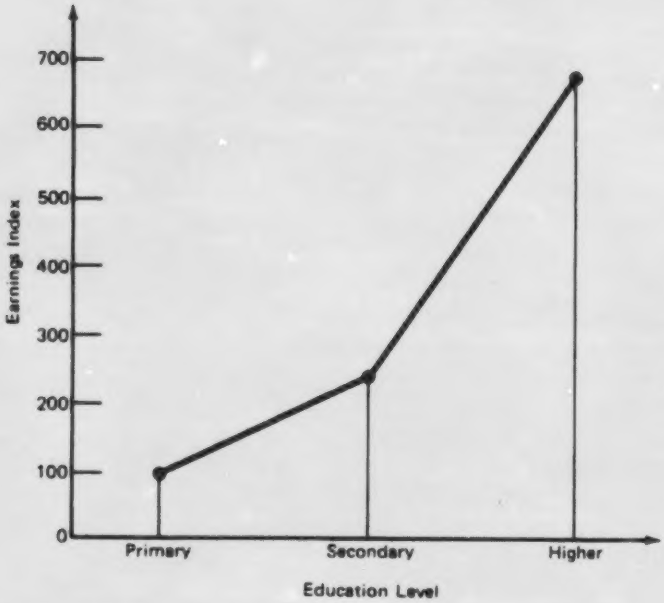
[2] For the main variant of this model see Thurow and Lucas, 1972.

The Earnings Structure

6.21 Appendix D contains a set of tables giving examples of the earnings structure by level of education and, especially, by field of specialization within higher education.

6.22 As noted earlier, the earnings structure by level of education is such that graduates of each successive level earn more than graduates of the preceding level. This seems to be a universal truth and applies to such diverse countries as Zambia, Sudan, Pakistan and Iran. This proposition seems to hold for employed as well as self-employed persons (see Tables D.2 and D.3). 1/ To put it schematically, university education has the quantifiable and well documented effect of adding a substantial income chunk to a control group of non-graduates (see Figure 6.1).

FIGURE 6.1 The Effect of Education on Income from Employment, in Developing Countries



Source: Table 3.3

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1/ It is important to remind that the self-employed are neither "screened" nor "irrationally" paid by a non-profit maximizer employer.

6.23 This is something we know. What we do not know is how do the different fields of specialization compare in their income-generating effect. Information on the relative salaries of graduates by subject studied is extremely scanty. However, the material collected in Appendix D permitted the construction of Table 6.2.

Table 6.2: THE UNIVERSITY GRADUATES EARNINGS STRUCTURE BY SUBJECT

Country	All Subjects (Index Base)	Agriculture	Engineering	Sciences	Medicine	Social Sciences	Humanities	Economics	Arts	Law
Philippines	100	64	117a/	78				95b/	86	151
Zambia	100	79	87	93	90	104	104	109b/		137
Malaysia	100	89	95	83	118			112c/	83	89
Iran	100	108	122	94			82	94		
Tanzania	100	97	108	93	120				112	93
United Kingdom	100		100	93		105			104	
Developing Countries Average	100	87	106	88	109	104	93	103	94	118

a/ Average of civil, mechanical and chemical engineering.
b/ Business administration.
c/ Accountancy.

Source: Appendix D.

The numbers in this table are indices having a base of 100 corresponding to the all subject average within a given country. These indices have been constructed in order to avoid rupees, pesos and other confusions so that a pattern in the relative earnings structure might be detected. In spite of the index conversion, the evidence is very mixed for a generalization to be made. The pecking order of relative earnings advantage is as follows:

Agriculture	87
Sciences	88
Humanities	93
Arts	94
Economics	103
Social Sciences	104
Engineering	106
Medicine	109

These averages of course conceal differences between individual countries. In most cases, however, agricultural graduates earn substantially less than higher education graduates as a whole (Iran being the only exception). Also, science graduates earn invariably less than the average student body. Contrary to what might be expected (because of the non-specificity or technicality of the curriculum), social sciences, economics and law graduates are doing rather well in some country settings.

6.24 This is confirmed by opinion studies of the social desirability of given professions in developing countries. For example, in Tanzania, social scientists rank among the top most desired professions, whereas agriculturalists and natural scientists rank last (see Table D.10).

6.25 It is also worth noting that nonvocational salaries are not only high relative to other subjects, but they also grow faster over time (see Table D.8). For example, compare the mid-career to starting salary growth in Tanzania:

Arts	49%
Engineering	36%
Medicine	29%

What this means is that arts graduates, even if they start low, later in life they find a niche and their earnings grow faster than, say, engineers. Could this be due to the fact that arts graduates are more flexible to adapt to new situations, whereas engineering graduates have learned too narrow a vocational skill that has no alternative value when technology changes? To put it differently, could it be that arts graduates have a greater on-the-job learning potential and this is later reflected in the lifetime path of their earnings?

6.26 The evidence presented here is consistent with the hypotheses contained in the above questions. However, the small number of observations preclude any possible rigorous statistical test of these hypotheses.

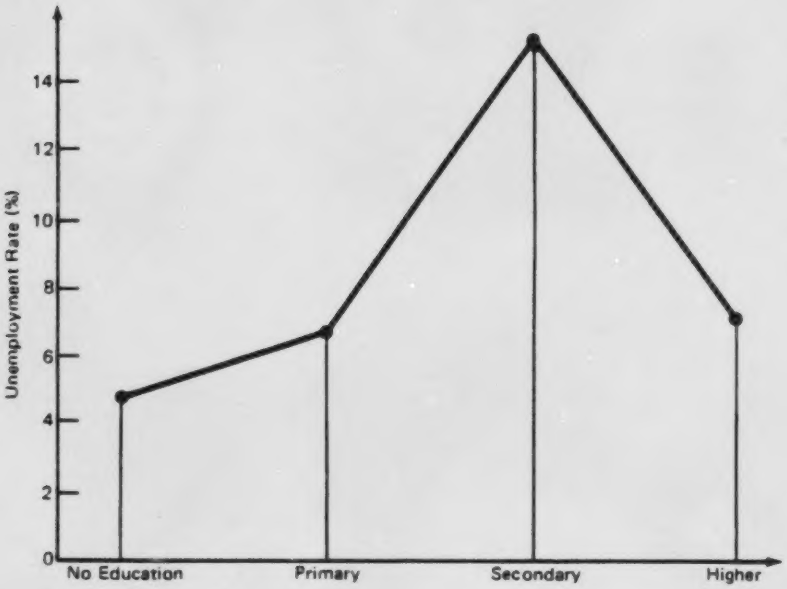
The Employment Structure

6.27 Appendix E contains a set of tables giving information on the employment-unemployment structure of university graduates. The evidence relates to two aspects of unemployment: incidence and duration. Let us examine them in turn.

6.28 By way of introduction, Table E.1 gives the typical structure of unemployment rates by level of education in developing countries, namely the familiar inverted U-shape curve (see Figure 6.2). Unemployment peaks at the secondary-college dropout level with an incidence of 15% (in the Philippines example) relative to 7% for college graduates. The unemployment rate of college graduates is nearly equal to the average unemployment rate in the country as a whole and it has remained steady in spite of the tremendous expansion of graduates between the early and late 1960s.

6.29 Table E.2 documents by means of the Singapore case the well known fact that no matter what the incidence of unemployment is, this is a declining function of age. Figure 6.3 shows the Zambian case where only a small fraction of graduates remained unemployed six months after graduation.

FIGURE 6.2 The Unemployment Rate by Level of Education in the Philippines



Source: Table E.1

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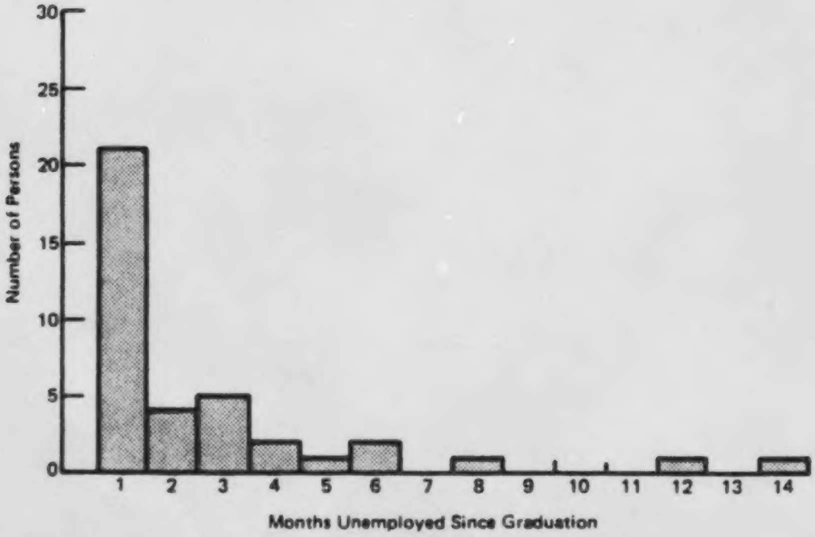
FIGURE 6.3 Unemployment as a Function of Time Since Graduation



Source: Sanyal et al. (1976), p. 211

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6.30 This period of unemployment between graduation and first job is often misinterpreted as inefficiency of the school system to produce graduates "relevant" to the needs of the economy. Today this thesis has been weakened for several reasons. First, as we have shown above, the period of unemployment is relatively short and the graduate, sooner or later, finds a niche. Second, this short waiting period might be healthy in terms of the search process (from the point of view of the graduate and the employer) that has to go on before either party is committed to a contract. Thirdly, it has been proved that this period of "unemployment" makes full economic sense when one compares the costs and the benefits of waiting: the private returns continue to be advantageous to the individual after correction for an initial period of unemployment. 1/

6.31 But how does the unemployment incidence or duration compare across different fields of specialization? Again, the evidence on this front is not abundant. 2/ Nevertheless, the material compiled in Appendix E allows us to draw up a comparative table (Table 6.3) in this respect. The figures shown in this table are indices having a base of 100 corresponding to the overall (i.e., all higher education subjects) unemployment rate within a given country. A figure above 100 in a given cell signifies an above average unemployment rate for the kind of graduate to which it refers. Correspondingly, a figure below 100 means a below average unemployment rate.

Table 6.3: THE UNIVERSITY GRADUATES UNEMPLOYMENT STRUCTURE BY SUBJECT

Country	All Subjects (Index Base)	Agriculture	Engineering	Sciences	Medicine	Social Sciences	Humanities	Economics	Arts	Law
Singapore, 1975	100		106	69		77		38a/	69	76
Singapore, 1976	100		94	106		13		88a/	75	38
Korea	100	99	90	109	68	93	112		127	
India	100	56	77	168				168	168	
Sudan	100	24		93				119	98	165
Average	100	60	92	109	68	61	112	103	107	93

a/ Business Administration.

Source: Appendix E.

6.32 Once more the evidence is very mixed as to be able to draw generalizations. Sciences, humanities, economics and arts graduates appear to have on the average a higher incidence of unemployment, whereas agriculture, engineering, social sciences and law graduates are doing better in terms of employment.

1/ For the most indepth documentation of this fact, see Blaug, et al., (1969), who have solved the apparent puzzle of high rates of graduate graduate unemployment in India along with a strong social demand for university education.

2/ Personally, I consider it a pity to have heard so much from different quarters in recent years about "tracer studies," yet not being able to trace the results of these studies in the literature. However, see Zymelman (1976).

6.33 Appendix Table E.5 presents another employment-related statistic referring to the University of Philippines graduates: the percentage of those absorbed five years after graduation in all fields or in their own fields. Law, physical science, liberal arts and business administration graduates exhibit absorption rates in excess of 90%. Mechanical engineering, civil engineering and especially agriculture graduates are doing worse in terms of absorption five years after graduation. The difference between own-field and all-fields absorption could be given a double interpretation. One possible interpretation is social inefficiency since a significant proportion of these was obliged to perform another job function (relative to that studied) in order to find employment. Another interpretation, however, is that absorption in other fields reflects flexibility in adapting to new situations. In this respect it is interesting to note that liberal arts graduates exhibit a higher all-fields absorption (95%) relative to their own field (81%).

6.34 Appendix Table E.8 contains evidence of a similar nature. The incidence of unemployment (or unknown destination) is highest among agricultural graduates of non-university institutions.

Income Distribution

6.35 Any policy that changes the relative reward structure in a given society automatically has an impact on income distribution. The provision of university education is such an action, as it clearly elevates the person who receives it to a higher income. Since graduates have incomes above the population average, it has been claimed that the provision of university education is inequitable: a group of persons will now be pushed into the above-average income class and income distribution might become worse. [1] Another sense in which the provision of higher education might run against equity is the Hansen and Weisbrod (1969) finance argument, namely the average taxpayer subsidizing the offspring of the elite class who attend colleges.

6.36 These are hot theoretical, empirical (and also, political) issues and the role of education as a whole on income distribution is still a highly contested one (e.g. see Pechman, 1970).

Some Additional Dimensions

6.37 Appendix F contains a set of tables with pieces of evidence pointing towards further advantages of nonvocational subjects. Thus Table F.1 shows that wastage rates in Zambia are much lower in the humanities (19%) relative to engineering faculties (40%). The capacity utilization of post-secondary non-university vocational schools is especially low in Sierra Leone (Table F.2), and the same remark applies to secondary vocational schools in El Salvador (Table F.3). A World Bank review of 42 case studies revealed the fact that general university faculties are on the average 40% overutilized, whereas technical and agricultural faculties are severely underutilized (see Table F.4). The same applies to secondary education distinguished by curriculum type. The high wastage and low utilization of technical-vocational faculties is indicative of social inefficiency.

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[1] For a discussion and empirical analysis of this issue see Marin and Psacharopoulos, 1976.

6.38 The development of local capacity in general subjects has a considerable foreign exchange savings potential. Obsession with vocational subjects can lead to unsatisfied demand for sociology, psychology and related fields, thus to study abroad (see Table F.7). For example, because of numerus clausus one-fifth of all Greek higher education students are attending colleges abroad at a considerable cost in foreign exchange.

6.39 The development of university capacity has further localization benefits. For example, Zambia had only 108 African graduates at the time of independence in 1965 (Sanyal, et al. 1976, p. 57). By 1971, 88% of secondary school teachers continued to be non-Zambian (Ibid., p. 60). Aklilu Habte (1974) reports the proportion of Ethiopian staff at Haile Selassie University changed from 34% to 57% between 1962 and 1973. It is in situations like these that university expansion could be considered an overriding goal providing definite benefits that are extremely difficult to quantify.

SECTION VII

A CASE FOR NON-VOCATIONAL UNIVERSITY EXPANSION

7.1 In the previous sections we have separately examined the costs and benefits of university education. The purpose of this section is to pull the two threads together in order to arrive at some social efficiency measure of higher education. This will be done in two steps. First, an assessment will be made of the economic efficiency of higher education as a whole, and second, we shall discuss the efficiency of particular higher education subjects.

The Economic Efficiency of University Education

7.2 It might be recalled earlier in this paper we mentioned that higher education is socially very expensive relative to other levels, especially in developing countries. The material collected in Appendix C fully confirms this picture. According to summary Table 7.1, the relative unit cost structure between the primary (=1), secondary and tertiary educational levels is as follows:

Developing Countries:	1 : 3.5 : 16.1
One Developed Country Example (France):	1 : 3.1 : 4.4

This often documented relative expensiveness of higher education understandably makes it vulnerable to a low priority in state budgetary allocations, if not to direct cuts.

Table 7.1: THE UNIT COST STRUCTURE BY EDUCATIONAL LEVEL
(Index: Primary Education = 100)

Country	Primary	Secondary	Higher
El Salvador	100	237	1085
India	100	508	2295
Malaysia a/	100	230	1476
Papua New Guinea	100	469	n.a.
Philippines b/	100	389	858
Indonesia c/	100	210	1781
Bangladesh	100	400	800
Pakistan	100	350	3000
Selected Asian Countries c/	100	554	2978
France	100	313	435
Developing Countries Average	100	349	1614

Note: Data refer to recurrent cost unless otherwise indicated.
a/ Includes foregone earnings.
b/ Includes capital costs.
c/ Refers to capital costs.
Source: Appendix C.

7.3 Of course this view is one-sided. Budgetary decisions cannot be taken on the basis of costs alone. The benefits side must be examined as well. Now, the problem with education in general is that the benefits side cannot be made as explicit as the cost side, hence the Finance Minister is usually more articulate than the Education Minister in claiming funds.

7.4 Several attempts have been made in the literature to document the benefits side of education, and earlier in this paper we have made an effort to increase the available data set, especially on the subject breakdown.

7.5 When costs and benefits are brought together a completely different picture emerges regarding the priority of higher education vis-a-vis other sectors. [1]

7.6 Table 7.2 summarizes evidence on the economic returns to higher education and physical capital in a number of countries. One cannot overemphasize the fact that there exist comparability problems both within and between countries. However, there is no reason to suppose that biases exist in only one direction rather than another as to make the attempted comparison meaningless. There exist as many problems in estimating the returns to investment in physical capital as for estimating the returns to human capital.

Table 7.2: THE RETURNS TO HIGHER EDUCATION
AND PHYSICAL CAPITAL
IN SELECTED COUNTRIES
(percentage)

Country	Rate of Return to	
	Higher Education	Physical Capital
Mexico	23.0	14.0
Colombia	8.0	2.0 a/
Venezuela	23.0	16.7
Chile	16.3 b/	15.0
Brazil	14.5	10.0 c/
India	12.7	12.5
Philippines	11.0	10.5 d/
Ghana	16.5	8.0
Kenya	8.8	18.8
Uganda	12.0	10.0 e/
Nigeria	17.7	23.0 f/
United States	9.7	9.7
Canada	14.0	12.9
United Kingdom	3.2	8.6
Netherlands	5.5	16.8
Belgium	9.3	4.4
Developing Countries Average	14.9	12.8
Developed Countries Average	9.3	10.5

Note: Rates of return are social.
a/ Irrigation project, Table H.1.
b/ Morales et al. (1977).
c/ Hydroelectric project, Table H.1.
d/ "Business Day," 1971 estimate, ILO, World Employment Programme (1974), p. 571
e/ Highway project, Table H.1.
f/ Road project, Table H.1.

Source: Unless otherwise indicated, Psacharopoulos, 1973, Table 4.1 and this study, Appendix H.

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[1] For a World Bank study in this spirit, see Thias and Carnoy (1972).

7.7 The summary picture that emerges is that the returns to higher education in developing countries are higher than returns to physical capital (14.9% versus 12.8%, respectively). In nine out of the eleven developing country cases listed in Table 7.2, the returns to investing in universities are higher than the returns to investing in machines. Also, in reviewing the returns to education versus physical capital, Van Ginneken (1980, p. 27) comments as follows: "All ... estimates indicate that both the private and social rates of return are highest for the fifth and sixth year of primary education and the fourteenth to sixteenth year of schooling (university). These rates of return vary between 25 and 50 per cent, which is well above the rate of return on physical capital (between 15 to 20 percent)" (italics mine).

7.8 Of course, given the latitude within which both kinds of returns must lie, one cannot say with precision that the relative advantage of universities is 2.1 percentage points. But one thing is for sure: the returns to higher education are in many cases at least as high as the returns to other projects in the economy such as highways, power plants or irrigation (see Appendix H).

7.9 Table 7.2 contains another interesting feature. When reference is made to advanced countries, the returns to the two types of projects follow an inverse pattern. Namely, physical capital projects in developed countries seem to have an advantage of 1.2 percentage points relative to higher education. Also, the returns to both types of projects are lower in developed countries relative to developing countries. Both patterns are fully consistent with economic theory. Namely, one would expect that given the relatively higher capital stock (both material and human) in developed countries relative to developing countries, the level of returns in the former would be lower than in the latter. Also, the relatively higher human-to-material capital ratio in developed countries has caused a relative depression of the returns to university education. Of course these are partial explanations and by no means sufficient conditions for the observed patterns. However, they point toward what one would expect from economic theory.

7.10 The just over one percentage point difference between the two kinds of returns in developed countries should not be taken literally as it might be due to small number, sampling or methodological estimation differences. But again, one cannot resist the economic explanation that both kinds of investment in developed countries have proceeded to the point of near equalization of returns at the margin.

The Returns by Field of Specialization

7.11 Having established that the economic returns to higher education as a whole are at least of the same order of magnitude as the returns to other forms of investment, we now ask the question of what are the differential returns to specific subjects within higher education itself.

7.12 The material collected in Appendix G permits us to draw up a summary Table 7.3 on the returns to higher education by subject in a number of developed and developing countries.

Table 7.3: THE SOCIAL RETURNS TO HIGHER EDUCATION BY SUBJECT
(percentage)

Country	Agriculture	Engineering	Sciences	Medicine	Social Sciences	Humanities	Economics	Arts	Law
Philippines	3.0 a/	10.3 b/					10.5 c/		15.0
Iran	13.8	18.2	14.2			15.3	18.5		
Malaysia	9.8	13.4		12.4					
India		16.6				12.7 d/			
Brazil	5.2	17.3		11.9			16.1		17.4
Norway	2.2	8.7	6.2	3.1			8.9	4.3	10.6
Canada e/		2.0					9.0 c/		
United Kingdom f/		11.4	11.0		13.0			13.5	
France			12.3				16.5		16.5
Denmark		8.0		5.0			9.0		10.0
Sweden		7.5		13.0			9.0 c/		9.5
Belgium			8.0 g/	11.5			9.5		6.0
Developing Countries Average	8.0	15.2	14.2	12.2	n.a.	14.0	15.0	n.a.	16.2
Developed Countries Average	2.2	7.5	9.4	8.2	13.0	n.a.	10.3	8.9	10.5

a/ Based on the assumption that the "less than 5%" rate of the "agriculture" subject as reported in the original souce is equal to 3%.
b/ Average of civil, chemical and mechanical engineering.
c/ Refers to business administration or commercial studies.
d/ Refers to non-engineering first degrees.
e/ Refers to Master's degrees.
f/ Refers to marginal rates of return.
g/ Refers to the average of applied and pure science.

Source: Appendix G.

7.13 The picture that emerges is as follows: in most cases, the returns to different subjects are of the same (if not higher) order of magnitude as the returns to alternative projects (see Appendix H). Second, it is sometimes the case that general subjects such as humanities and economics are financially more profitable than technical subjects like engineering and agriculture. This is because the higher cost of the latter kind of subjects outweighs their apparent higher benefits (see Appendix D). This proposition holds in both developed and developing countries.

7.14 The case of agricultural specialization deserves special mention as this subject exhibits the lowest social returns in developing countries. In terms of averages, the pecking order of returns in some fields is as follows:

Agriculture	8.0%
Medicine	12.2%
Economics	15.0%
Law	16.2%

7.15 That the returns to particular higher education subjects are competitive with alternative returns is shown by citing the following examples from the yields from other sectors. 1/

Railways	15.6%
Power Plants	8.5%
Water Supply	8.5%

1/ From Table H.5. Returns refer to the "high" estimate at audit.

Further Considerations

7.16 This conclusion was strictly based on the efficiency argument among the criteria for social choice discussed in Section III, above. Expanding the criteria list could only strengthen the case for non-vocational higher education.

7.17 Thus in the previous section we have documented the fact that it is superficial to think the provision of higher education will result in a score of unemployed graduates. When one considers not only the incidence of unemployment but also its duration, any related adjustment of the above efficiency measure is likely to become trivial. This proposition holds for all kinds of subjects.

7.18 But the field of specialization controversy might be a lot more subtle than the quantitative evidence presented thus far. It is for this reason we now extend the inquiry to the non-quantitative domain. This is done in the following section by reference to a variety of curricula and sociological paradigms.

SECTION VIII

LIBERAL EDUCATION IN DEVELOPING COUNTRIES?

8.1 The desirability of liberal education programs in developing countries, particularly at university level, is less than self-evident for the following reasons: first, the "common sense" viewpoint that, given competing claims on investment resources, vocational programs should be given overwhelming priority; and second, anxiety concerning the social distribution of liberal university education in a variety of cultural settings. Liberal education might in some circumstances appear elitist, or even to offer a kind of civilized self-indulgence to a small section of the population, and thus to be unrelated to development, the most tangible product of which is held to be economic advance.

8.2 This nonquantitative section argues from different premises. Its underlying thesis is that a "general" element is needed to function alongside vocational education, and that the interrelationship of the entire educational provision is the real object of policy.

8.3 Education, liberal or otherwise, is not a random activity. It is intentional, goal directed. A few such goals, at their crudest, might be delineated as follows:

(i) Instrumental skills, such as literacy and numeracy.

(ii) The omnibus of social, cultural and industrial roles generated by society.

(iii) Personal autonomy and self-realization.

(iv) Social education, and in particular, personal adaptability to social, cultural and technological change.

8.4 All of these objectives should be represented in a defensible educational program at all levels. To some extent, therefore, the vocational versus liberal choice might be a false dichotomy, since any society will "balance" provision, perhaps differently at different levels. 1/

8.5 Instrumental skills are "liberal" in spirit, purporting to develop a flexible underlying competence in the symbolic systems necessary for the development and maintenance of a complex society. Some of the work done at university level, like the ability to conceptualize policy-related problems or the ability to criticize legal arguments, might be just a tertiary level equivalent of a basic literacy program.

1/ In advanced countries there is a tendency, also, for institutional specialization, although this is breaking down. In England, for example, the universities largely represent a tradition of "pure" knowledge; the polytechnics mainly represent a tradition of vocational education; and the technical colleges specialize in vocational training.

8.6 Philosophers of knowledge have attempted clustering disciplines by reference to their logical characteristics, as "forms of knowledge" or "realms of meaning." Indeed, one widely-held view of liberal education within this tradition is that man is liberated by systematic induction into these broad forms of thought. The notion of knowledge-put-in-use introduces another pedagogical model, that of the "integrated field" in which a number of contributing disciplines are brought to bear upon social, technical or developmental problems (King and Brownell, 1966; Musgrave, 1973).

8.7 Part of the legacy of liberal education is the role it plays in training individuals to be adaptive intellectually (Archambault, 1965; Curle, 1963). That is, it defines its students as future social change agents, based in part on what Hardison (1972) has called "the critical values of openness, toleration and measured skepticism." This model has clear relevance for the developing countries, particularly as outside-initiated, technically-led innovation is likely to run into problems of tissue-rejection. Unless there is cultural development, technical development may be wasted, or even counterproductive (Watson, 1969).

The Technology-Led Advance: A Critique of the Paradigm

8.8 The main assumption behind the practice of foreign aid has been that the supply of Western technical manpower and expertise to the developing countries would somehow give birth to a technological infrastructure that would put the developing countries firmly on the road to development. Technological development, as the social scientists have been arguing since the early 1960s, is a complex process that cannot be considered in isolation. It is now generally admitted that development implies more than the overt acceptance of material and technical improvements. Both aid-donors and aid-receivers are increasingly becoming aware that, unless the social mechanisms of change are considered in their totality, the chances of success are greatly reduced, no matter how adequate is the provision of social and physical infrastructures (markets, credit-agencies, irrigation schemes, transport, etc.). It is also becoming apparent that some kinds of experience cannot be transmitted the way technical skills are and must be generated within the social structures of the societies to be developed.

8.9 The realization that the targets of economic development have a human capital dimension is not a new discovery. It has often been pointed out that large numbers of technocrats will not turn into responsible policymakers; that what is needed is people who can formulate, understand and support purposeful, principled and courageous policies. An initial argument can be put for a liberal educational program to encourage the cultural autonomy and flexible wisdom of future policymakers.

8.10 One should express skepticism regarding the vocationalist approach to higher education. The belief that there should be a close link between the content of study and subsequent employment has severe limitations. Perhaps educational requirements of developing countries are different from those in developed countries and the experience of the latter on matters of educational policy is not necessarily relevant for the former.

Perhaps education in developing countries should be adapted to the specific economic requirements of these countries, the explicit assumption being that knowledge generated outside the developing countries can be tailored to fit these requirements. However, several arguments stand in contrast to this seemingly "common sense" viewpoint: first, the adaptability of educational policies to the requirements of the developing countries has often meant in practice an emphasis on provision and supply of technical expertise for the requirements of technological development at the exclusion of more general knowledge. On general theoretical grounds, the underlying assumption that the requirements of developing countries are simply "technical" in nature is open to challenge. It relies on a conceptually naive dichotomy between skills (know-how) and theoretical or propositional knowledge (know-whether).

8.11 Another line of argument runs as follows: if indeed education has been artificially fragmented to serve societal expediency, perhaps reflecting the exercise of power among social groups, what analogies can be drawn for a world wide fragmentation of education, on the grounds of expediency, whereby some countries specialize in the production and export of people capable of conceiving problems in their totality, while others are advised to adapt education policies to purely technical requirements? What implications did this have in the past or will have in the future brain drain?

8.12 Finally, there is the more prosaic problem of what the nature of this adaptation of Western experience to developing countries' requirements should be. Bearing in mind the limitations imposed in the transmission of experience, as distinct from skills and know-how, it would be over-optimistic to expect that, by acquiring a particular type of know-how, a society would achieve the state of development that was associated with it historically. The developed countries can only furnish a limited number of examples of the way to economic growth. It is up to the developing countries themselves to seek out the way most suited to their needs (call it self-reliance, if you wish).

8.13 Liberal education might, however, be charged with another responsibility--one less susceptible to task descriptions and the specification of performances, but one that permeates and filters through, precisely because the concept behind it is liberating rather than restricting. On this view, the role of liberal education is to make available a wider range of choices for decisionmaking and action. By being less, rather than more selective, it both gives the opportunity to individuals to develop according to their inclinations and it makes it possible for societies to tap the intellectual potential of their members; and by teaching people how to learn, rather than what to learn, it gives people the chance to generate their own answers rather than accept those enforced upon them by others. In short, liberal education generates the heuristics by which problems might be tackled, rather than stabilizing the performances locked into the current "solutions."

Education and Underdevelopment

8.14 Although it has long been recognized that a low rate of literacy is a crucial constraint upon the evolution of a society, it is often less clear what the exact relationship between education, beyond the literacy level, and economic growth involves. The uncertainty is rooted, not in the inadequacy of social scientific methods to locate the relevant areas of research, but in the fact that the effects of education become apparent within a time span exceeding in duration the life of the generation that implemented any specific educational policies. The dynamic evolution of interconnected social phenomena prevents us from isolating variables for the purpose of establishing unambiguous causal relationships.

8.15 On the question how far is education a prime mover of economic growth, the historical evidence is equivocal. In England "the industrial revolution was accomplished by hard heads and clever fingers" that had no systematic education in science or technology (Halsey, 1961). On the other hand, in the case of Denmark and the Soviet Union, it seems that education played a crucial role in economic development. Consequently, although it is largely recognized that there is a correlation between high rates of growth and high rates of expenditure on education, this is not necessarily evidence for a causal relationship (Anderson and Bowman, 1963). Nevertheless, the reverse is also asserted: that there is no economic growth without an adequate education system. It is a truism to say that education is a necessary but not a sufficient condition for economic development. The real issue is perhaps a different one: what curriculum policies are likely to have what results? This implies a shift of attention from quantity to quality differences between educational systems.

8.16 Attempts to place economic development against an analysis of the general cultural milieu have, for particular times and places, been discouraging. Examples might be generated of culture-related unanticipated constraints that have blocked progress. Economic development in Russia was strongly resisted by the traditionally educated kulaks. Conservative forces so dominated the Oxbridge curriculum that the divorce between town and gown, academia and the world-of-work, became itself sacrosanct, ideologically not open to reexamination. The correlation between technnical education expansion and the growth of productivity simply points to the link between economic development and a cultural, ideological and social infrastructure. The question is which configurations work, and can they be generated? Although all this evidence permits us to establish a historical correlation between "traditionally" educated elites and their resistance to modernization, it is again by no means clear what the exact causal relationships are. Were the elites opposed to modernization because of the type of education they had, or because they believed that whatever kind of social change was advocated threatened their political and economic supremacy? Let us consider a few examples.

8.17 Ghana: The Imported Value System. This is a typical case of what happens when, in the absence of cultural reconstruction to match technical development, a whole value system is imported. In a study among Ghanaian students the majority saw themselves occupying positions of leadership after graduation (Jahoda, 1955). Some of the students' remarks were typical examples of this trend: "I should like to enter politics and give the country the benefit of my experience."; "I want to be an ambassador of Ghana to a foreign country."

8.18 University students in developing countries are frequently introduced into a style of life which is vastly different to the style of life of their family and cultural background. To the question what their experiences were on returning back to their families during the vacation, about 55% of the Ghanaian students replied that they either had to go through a difficult period of adaptation or that they could never get used to life at home again. Difficulties of adaptation and rejection of family culture rested on a variety of reasons: the students felt that they were "different" from relatives and former associates, or the latter made it obvious that they considered them different.

8.19 In another study, Barkan (1975) reports that the University of Ghana, Legon, is patterned after the Oxbridge model to an unprecedented degree, to the extent that "English academic terms were employed whenever remotely appropriate, such as naming the terms of the school year. Status ranks between members of the university community were more rigorously maintained, and in general, staff/student relations were of an authoritarian nature." Although the university ostensively patterns itself on the ideals of democracy and liberalism, it is a highly authoritarian institution that keeps a tight control on its "dissident" students. Contrary to patterns found in some other countries, Barkan found that African students were less likely to be in favor of change. They tended to conform with the established order, provided they had secured a niche for themselves within that order. Since university education virtually implies enhaced social status and far better incomes than those earned by the rest of the population, university students had a large stake in the present system, and quickly fell into the habits of mind associated with conservation rather than critique.

8.20 Malaysia: Universities as Failed Change Agent. This example arises from a study taking a pathological perspective on the failure of the Malaysian universities to provide the intellectual climate for effective social and economic planning. Lim's (1974) study attributes the failure of the academic input to the following categories:

> First, the indiscriminate application of Western models of planning. These development plans are mainly influenced by the "capital-centered" approach, and although these models may be logically consistent, it is doubtful whether the assumption on which they rest, i.e. shortage of capital, is valid in a country like Malaysia.
>
> Second, the fact that universities have not been able to compensate for these models by providing alternative ones. This is because university syllabuses reproduce courses imported from the West that again are badly suited to the needs of Malaysia. "Students can choose to take courses such as economic development, planning or agricultural marketing without having first acquired the basic economic, mathematical and statistical background."
>
> Third, the very often meaningless syllabus distinctions made as, for example, between "analytical" and "applied" subjects. Lim comments aptly that "it is difficult to visualize a situation where an applied economist could study an economic problem properly without having a

thorough grounding in economic theory. The same can be said about the distinction between 'applied economics' and 'rural development': "the latter is part of the former, and the study of rural development, unless conducted within a theoretical framework, becomes no more than a descriptive account of the institutions and problems of the rural sector." Lim suggests instead an interdisciplinary approach that will entail the teaching of hybrid subjects such as economic anthropology, which have evolved from genuine attempts to look at development problems from a wider perspective.

Fourth, the absence of university participation in government research programs. It is rather surprising that, despite the recognized scarcity of human capital, the participation of university staff in government sponsored research programs is minimal. For example, out of a staff of 81 at the Faculty of Economics and Administration, only two were involved in joint research with the Economic Planning Unit, the government agency concerned with development planning, and these two were only tutors working for their Master of Economics degrees.

Equally low was the academic participation in consultancy services, either in the form of membership in government committees concerned with planning, or contracts for carrying out feasibility and other studies for the government for a fee. Only five members of staff were involved in research of the latter type and three of them became involved in the project "only because of the initiative of a World Bank transport economist who was amazed at the lack of cooperation between the universities and the government in research."

8.21 It must also be stressed that it is not only the government that underestimates the role academics can play. The universities themselves are sometimes reluctant to undertake projects, particularly large scale projects. Lim cites the example of the Klang Valley Development project. Although the government offered the entire project to the University of Malaya, the latter turned down the offer on the grounds that it did not possess the managerial and supervisory skills required for such a large project. The project, which required expertise extending from engineering to social sciences and law, was finally awarded to a foreign consortium, and out of a staff of over 520 at the university only three engineers were invited to take part.

Some Generalizations

8.22 From the examples cited, and from general indications in the literature, it is now possible to give a tentative interpretation of some of the problems already encountered in developing countries.

8.23 There is a tendency for higher educational institutions in developing countries to adopt some of the surface features of their Western counterparts. Dysfunctional features inherited include the cumbersome administrative paraphernalia, the social divisions, and the definitions by which different segments of knowledge attract differential prestige (that which Michael Young, 1971, in his examination of UK school programs called "high status and low status knowledge").

8.24 There exists lack of liaison between the courses offered in the industrial/technical institutes and the local economy. In one case in Southern Italy, 37% of the total number of students completing such courses went on to university because of lack of professional outlets (see Moscati in Kloskowska and Martinotti, 1977).

8.25 Under these conditions, higher education may actually reinforce the problems it is intending to eliminate. Universities can become the means of socially reproducing the status quo. This is the opposite of the aspirations of liberal education to generate a widely based cultural critique as well as generalized educational competences.

8.26 There is a crisis in leadership education. Leadership appears to require the kind of holistic perspective that one might with most optimism associate with the cast of mind of liberal education. This holistic perspective can be transmitted by the universities through carefully designed courses that will familiarize students with their country's culture, the people's actual needs, and the major theoretical contributions in the area of politics, the economy and society.

8.27 It is now possible to revisit the concept of liberal education and indicate the scope and direction of any investment that can be held responsibly to offer hopes of inroads into the intractible problems outlined above. Such a liberal education program at a university in a developing country would have most chance of success in relation to generating conditions of cultural, social, economic and technological development if it were characterized as follows:

> The intellectual basis of the program should be balanced between the provision of culture-related core programs task orientated workshops, and induction into the intellectual inquiries that allow both reliable knowledge and autonomy in decisionmaking.
>
> The context of liberal education in a total curriculum map should be kept constantly in mind, so that the implications for other sectors are clearly understood. For example, it would be foolish not to accept the priority, in some instances, of rural development programs. Liberal education courses, when society-related would, for example, familiarize students with knowledge of broader practicalities, like the state of the economy or agriculture.

8.28 What liberal education does is to make people aware of the variety of choices for human behavior. It provides intellectual competence and awareness of problems and solutions. It does not only teach people how to do things, but also how to think about them. Wide experience and familiarity with a variety of courses give people greater freedom. It is in this sense that the word "liberal" can be given any meaning at all: the broadly educated person is freer than the person who has had a narrow training.

8.29 Finally, the study of the modern intellectual tradition in developing countries can provide a way of perceiving problems in a world wide perspective. Since achieving independence many developing countries have produced their own indigenous scholars, poets, playwrights and litterateurs who are in a better position than outsiders to understand and articulate social needs and problems; whereas on the one hand they express the unique experiences and predicament of their own countries, on the other they form links between their own societies and the rest of the world.

SECTION IX

CONCLUDING REMARKS

9.1 In this paper we have gone through two kinds of evidence in examining the economic foundations of investment in higher education. The first kind of evidence was quantitative, referring to costs, monetary benefits, employment, income distribution and social demand. The second kind was mostly qualitative, such as the case for a non-vocational curriculum. The conclusion we reached seems to be advancing the rather counterintuitive notion that a considerable element of software, general faculties might be needed along with narrower vocational courses in developing countries. This notion sounds odd because the very idea that human resources can be thought of as a developmental factor virtually started with the launching of the Soviet Sputnik in the mid-1950s. This was a technical achievement and encouraged the idea that the promotion of science could lead to innovations, not only in space, but in industry as well, thus accelerating economic growth. The catalyst towards these innovations was, of course, engineers and technicians rather than lawyers or secondary school graduates of the general curriculum type. A number of international conferences held at the time had a dramatic effect on emphasizing the need for scientific and technical personnel for economic growth and development. [1]

9.2 As this happened over two decades ago, one may ask what is the current state of thought in the literature regarding the economic value of technical or vocational education? There certainly exists skepticism on this issue. The initial enthusiasm for technical education was dampened by the documentation of the fact that a high correlation between technical education and economic development does not necessarily mean that the former was a cause of the latter. In fact the direction of causation might have been the other way around, namely from economic development toward increased enrollments in vocational schools. The case here is similar to that of minimum schooling laws that have been historically found to follow the pressure for increased enrollments in schools (Landes and Solmon, 1972).

9.3 Even if a causal link were established between vocational training and economic development, it does not follow that this training would have to take place in formal schools (Stoikov, 1975). In fact, vocational education originated outside the formal school system and a great part of it takes place today in the form of apprenticeship on the shop floor. As the state of technology becomes more and more sophisticated, formal schools are unable either to keep up with or provide the necessary training. The firms involved, however, keep instilling specific skills in their employees following the latest technological developments.

9.4 Another factor is the ease with which differently trained manpower can be substituted for each other. It has now been well documented that the degree of substitution in production between different kinds of skills is on the high side, hence weakening the view that fixed skill proportions are needed for the efficient operation of the economy (Dougherty, 1972). The evidence on high substitution elasticities tends to invalidate the case for the necessity of a given amount of technicians for economic growth. When this is combined with the relative expensiveness of technical education, one might wish to tap the potential of general faculties as well.

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[1] E.g. the OECD 1959 Hague Conference on Techniques for Forecasting Future Requirements of Scientific and Technical Personnel (see OECD 1960).

9.5 We might conclude that in this paper we have rediscovered Foster's (1965) "vocational school fallacy," although at a higher level. What Foster argued was against the provision of vocational training within formal educational institutions for the purpose of promoting economic development. In fact, general education should be thought of as a prerequisite for technical education and the latter should be provided more efficiently on the job rather than inside the school. Fifteen years later the case for this view is no less compelling.

9.6 This conclusion, however, must be qualified by the analytical caveats discussed in the course of presenting the evidence. To recapitulate, it is the benefits side that is more elusive relative to the cost side and future research effort should concentrate on increasing evidence on the former. What seems to be urgently needed is an annual monitoring service of the labor market performance of the recent output of particular school types. It is only on the basis of this information that the policymaker could provide for a truly balanced educational system.

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Table A.1

HIGHER EDUCATION ENROLLMENT
AND RECURRENT COST PER STUDENT
(THE INTERNATIONAL CROSS-SECTION DATA BASE)

Country	Year	Enrollment Ratio (%)	Total Enrollment	Vocational Share (%)	Cost Per Student (US$)
GROUP 1					
Canada	1975	39.0	546,800	19	5474
United States	1975	57.6	3,525,100	25	8371
Japan a/	1975	24.7	2,248,900	28	971
Austria	1975	19.2	96,700	37	2278
Belgium b/	1975	22.0	83,400	53	6205
Denmark	1975	29.7	110,300	29	4513
Finland	1975	18.6	77,200	37	2442
France b/	1975	24.3	811,300	39	1758
West Germany	1974	19.3	786,700	32	3013
Ireland	1975	15.5	40,100	39	2203
Italy	1975	25.5	976,700	45	1182
Luxembourg c/	1970	1.6	400	25	985
Netherlands	1975	25.9	288,000	38	5222
Norway	1975	22.2	66,600	32	2901
Sweden	1975	28.0	162,600	43	3315
Switzerland	1975	13.8	52,600	46	6038
United Kingdom	1974	16.7	703,600	35	3318
New Zealand	1970	18.4	43,500	30	1891
GROUP 2					
Benin d/	1975	0.8	2,100	33	1216
Botswana	1975	0.8	500	00	3376
Burundi	1975	0.6	1,000	20	1771
Congo	1975	2.8	3,200	19	4227
Egypt	1975	13.5	426,100	39	399
Ghana	1975	1.2	9,100	32	3418
Ivory Coast	1975	1.7	7,200	24	5613
Kenya	1970	0.8	2,900	45	2829
Lesotho	1970	0.5	400	25	1093
Liberia	1975	1.6	2,000	35	1414
Madagascar	1975	1.2	8,400	38	858
Malawi	1975	0.3	1,100	27	3107
Mali	1975	0.6	2,900	45	1793
Mauritius	1970	2.7	1,100	37	374
Morocco	1970	1.5	16,100	17	1043
Rwanda	1975	0.3	1,100	36	1393
Somalia	1970	0.4	1,000	10	49
Sudan	1970	1.1	14,300	29	1050
Togo	1970	0.5	900	11	635
Uganda b/	1975	0.6	5,500	47	3009

Country	Year	Enrollment Ratio (%)	Total Enrollment	Vocational Share (%)	Cost Per Student (US$)
GROUP 2 (continued)					
Cameroon	1970	0.5	2,700	19	2565
Tanzania	1975	0.2	3,100	32	3682
Upper Volta	1975	0.2	1,100	18	238
Zambia	1975	1.9	8,400	70	1167
Barbados	1970	3.9	800	13	1607
Costa Rica	1970	10.3	15,500	13	327
El Salvador	1970	3.3	9,500	23	627
Guatemala	1970	3.5	15,600	37	273
Jamaica	1970	5.4	6,900	41	409
Mexico b/	1975	9.8	520,200	63	519
Nicaragua d/	1970	5.7	9,400	23	184
Panama	1970	6.6	8,200	28	669
Argentina	1970	14.2	274,600	37	124
Chile b/	1975	16.2	149,600	49	22
Colombia	1970	4.7	85,600	39	180
Guyana	1973	3.4	2,300	30	718
Paraguay	1973	5.5	7,900	32	304
Afghanistan	1970	0.5	7,700	45	270
Cyprus e/	1975	1.0	600	83	202
Dem. Kampuchea f/	1971	1.7	10,400	40	155
Hong Kong	1975	10.4	44,500	43	930
India	1970	6.4	2,903,600	39	115
Israel	1974	23.5	55,100	31	3712
Jordan g/	1970	2.2	4,500	16	579
South Korea	1970	8.0	201,400	61	76
Laos	1970	0.2	400	50	600
Malaysia	1970	2.0	17,000	36	1209
Pakistan	1974	1.9	114,900	39	169
Nepal	1975	2.0	23,500	22	100
Philippines c/	1975	20.0	764,700	35	18
Singapore	1975	9.2	22,600	53	1059
Sri Lanka	1970	1.2	12,300	28	271
Syria	1975	11.6	73,700	45	657
Thailand	1975	3.5	131,000	21	321
Greece	1974	15.5	97,800	34	706
Malta	1975	4.6	1,400	21	1610
Portugal b/	1974	11.6	64,700	43	493
Spain	1970	8.9	224,900	50	484

Country	Year	Enrollment Ratio (%)	Total Enrollment	Vocational Share (%)	Cost Per Student (US$)
GROUP 3					
Algeria	1970	1.7	19,500	45	982
Ecuador	1970	7.7	38,700	40	116
Venezuela	1975	19.0	199,900	40	2568
Iran	1970	3.1	74,700	50	501
Iraq	1970	5.2	42,400	44	805
Kuwait	1975	9.3	8,100	23	6561
Saudi Arabia	1974	2.6	19,800	23	20996

a/ Expenditure on public education only.
b/ Expenditure of the Ministry of Education only.
c/ State expenditure only.
d/ Federal or central government expenditure.
e/ Expenditure of Greek Education Office only.
f/ Ministry of Education only, including capital expenditure.
g/ East Bank only.

Source: Educational data from Unesco, Statistical Yearbook 1977, and earlier years.

Per capita income and exchange rate data from IBRD, World Bank Tables, 1975 (except for Luxembourg which is from IMF, International Financial Statistics, July, 1977).

Table A.2: COST FUNCTIONS: AVERAGE COST PER STUDENT (AC) DEPENDENT VARIABLE

Variable (1)	All Countries (2)	Developing Countries 1975 (3)	Developing Countries 1975 (4)	Developing Countries 1975 (5)
Constant	577	1813	1749	2316
Developed Country Dummy	1033 (1.02)	-	-	-
1975 Dummy	1569 (2.49)	-	-	-
Total Enrollment (000)	-	-	-3.03 (2.07)	-
Enrollment Ratio (ER)	18.9 (.46)	- 60 (1.38)	-	-336 (2.78)
ER^2	-	-	-	14.7 (2.44)
R^2	.161	.060	.125	.220
N	83	32	32	32

Note: Developing Countries exclude oil-producing countries.
Numbers in parenthesis are t-ratios.

Source: Based on the "International Cross-Section," Table A.1.

Table A.3: COST FUNCTIONS: REAL COST PER STUDENT (AC/Y) DEPENDENT VARIABLE

Variable (1)	All Countries (2)	Developing Countries 1975 (3)	Developing Countries 1975 (4)	Developing Countries 1975 (5)
Constant	4.235	11.883	8.971	2.924
Developed Country Dummy	.255 (.11)	-	-	-
1975 Dummy	5.312 (3.71)	-	-	-
Total Enrollment (000)	-	-	-.018 (1.98)	-
Enrollment Ratio (ER)	-.360 (3.85)	-.787 (3.63)	-	-
1/(2.ER)	-	-	-	9.234 (4.97)
R^2	.286	.305	.116	.451
N	83	32	32	32

Note: Developing Countries exclude oil-producing countries.
Numbers in parenthesis are t-ratios.

Source: Based on the "International Cross-Section," Table A.1.

Table B.1: HIGHER EDUCATION ENROLLMENT AND COST PER STUDENT IN GHANA, SELECTED YEARS, 1957-75

Year	Number of Students	Higher Education Share of Education Budget (percentage)	Cost Per Student (in constant 1957 US dollars)
1957	2,163	20.5	4,145
1960	2,959	13.3	4,047
1965	4,836	26.6	2,882
1970	5,426	25.1	1,650
1974	7,466	19.8	1,237
1975	9,079	16.8	736

Note: Cost refers to recurrent expenditure.

Source: Based on UNESCO, Statistical Yearbook, various years and International Monetary Fund, International Financial Statistics, various issues.

Table B.2: HIGHER EDUCATION ENROLLMENT AND COST PER STUDENT IN EGYPT, SELECTED YEARS, 1957-75

Year	Number of Students (in '000)	Higher Education Share of Education Budget (percentage)	Cost Per Student (in constant 1957 US dollars)
1957	83	13.8	201
1961	115	13.8	219
1962	143	20.8	309
1963	146	20.9	286
1964	144	21.4	298
1965	177	19.2	213
1970	218	20.4	195
1974	381	29.4	227
1975	426	30.0	210

Note: Cost refers to recurrent expenditure.

Source: Based on UNESCO, Statistical Yearbook, various years and International Monetary Fund, International Financial Statistics, various issues.

Table B.3: HIGHER EDUCATION ENROLLMENT AND COST PER STUDENT IN MEXICO, SELECTED YEARS, 1961-75

Year	Number of Students (in '000)	Higher Education Share of Education Budget (percentage)	Cost Per Student (in constant 1961 US dollars)
1961	94	15.2	259
1962	101	12.8	248
1963	110	13.9	270
1964	117	12.3	331
1965	133	12.7	323
1970	248	10.4	189
1974	453	11.7	256
1975	520	12.6	231

Note: Capital expenditure is included in the 1961-64 cost.

Source: Based on UNESCO, Statistical Yearbook, various years and International Monetary Fund, International Financial Statistics, various issues.

Table B.4: UNIVERSITY ENROLLMENT AND RECURRENT COST PER STUDENT, THAILAND, 1954-64

Year	Enrollment	Cost Per Student (in constant 1964 bahts)
1954	8,369	9,321
1959	12,451	6,153
1964	15,608	9,423

Source: Based on Reiff (1972), p. 219 and International Monetary Fund, Financial Statistics 1965/1966.

Table B.5: RECURRENT COST PER STUDENT, UNIVERSITY OF EAST AFRICA, 1968-70
(in shillings)

College	1968		1969		1970	
	Enrollment	Cost	Enrollment	Cost	Enrollment	Cost
Makerere	1,805	15,660	2,242	13,660	2,443	13,140
Nairobi	1,539	17,140	1,928	15,000	2,296	13,320
Dar-es-Salaam	987	15,520	1,292	13,100	1,542	11,600
Total	4,331	16,160	5,462	14,000	6,281	12,840

Source: Bennett (1972), p. 125.

Table B.6: ENROLLMENT AND COST PER STUDENT, UNIVERSITY OF ZAMBIA, 1969-73

Year	Student Enrollment	Cost per Student (in constant 1969 kwacha)
1969	991	3,808
1970	1,184	3,294
1971	1,567	2,888
1972	1,692	3,021
1973	2,158	2,658

Source: Sanyal et al (1976), op. cit., pp. 108, 112 and International Monetary Fund, Financial Statistics, 1974.

Table B.7: RECURRENT COST PER UNIVERSITY STUDENT, ZAMBIA, 1971-1977

Year	Cost Per Student (in constant 1969 kwacha)
1971	2,146
1972	1,915
1973	2,259
1974	1,814
1975	1,563
1976	1,942
1977	1,374

Source: World Bank Sources.

Table B.8: ENROLLMENT AND COST PER STUDENT IN PAKISTAN, 1964 AND 1975

Year	Enrollment	Student/Teacher Ratio	Recurrent Cost Per Student (current PRs)
1964	1,240	5	5,230
1975	3,000	8	5,345

Note: Data refer to Lyallpur Agricultural University.

Source: World Bank Estimates.

Table B.9: THE RELATIONSHIP BETWEEN THE AVERAGE COST PER STUDENT AND TOTAL ENROLLMENT IN HIGHER EDUCATION, FRANCE 1964-1978

Year	Number of Students Enrolled (in '000)	Cost Per Student (in constant 1976 francs)	Real Cost Index (1964 = 100)
1964	402	10,361	100
1965	452	10,226	
1966	515	9,231	
1967	564	10,002	
1968	621	9,857	
1969	729	9,310	
1970	755	9,169	
1971	801	9,062	
1972	838	8,736	
1973	892	8,105	
1974	897	8,045	
1975	940	7,705	
1976	997	6,985	
1977	1,015	7,073	
1978	1,020	7,138	69

Source: Eicher and Lévy-Garboua (1979), p. 262.

Table C.1: RECURRENT COST PER STUDENT IN EL SALVADOR, 1975

Educational Level	Cost Per Student (in colones)
Primary	123
Secondary	291[a]
General	136
Commerce	128
Industrial	269
Agriculture	174
Higher	1,334

Note: a/ Refers to a three-year cycle.

Source: World Bank estimates.

Table C.2: RECURRENT COST PER STUDENT IN THE SUDAN, 1974

Faculty	Cost Per Student (in LSd)
Agriculture	713
Science	605
Engineering	661
Medical Sciences	1,042
Economics	527
Arts	681
Law	700

Source: Sanyal et al (1975), p. 88.

Table C.3: RECURRENT COST PER STUDENT BY FACULTY, MAKERERE UNIVERSITY COLLEGE, 1965
(in shillings)

Faculty	Cost Per Student
Agriculture	34,532
Science	25,540
Medicine	27,822
Arts and Social Sciences	13,372
Education	13,246
Fine Arts	18,656

Source: Bennett (1972), p. 114.

Table C.4: STUDENT/TEACHER RATIOS BY FACULTY, MAKERERE UNIVERSITY COLLEGE, 1962-66

Faculty	1962	1963	1964	1965	1966
Agriculture	3	3	4	4	5
Science	6	4	5	5	6
Medicine	5	5	5	5	5
Arts and Social Sciences	8	7	10	11	13
Education	20	13	16	16	18

Source: Bennett (1972), p. 115.

Table C.5: ENROLLMENT AND COST PER STUDENT BY FACULTY, THAILAND, 1964

Faculty and University	Student Enrollment	Cost Per Student (in baht)
Engineering		
Khon Kaen	59	11,927
Chuladong Korn	1,342	3,651
Agriculture		
Agr., Husbandry	1,159	5,953
Veterinary Science	97	14,333
Economics		
Kasetsart	485	2,887
Thammasat	180	5,556

Source: Reiff (1972), p. 220.

Table C.6: RECURRENT COST PER GRADUATE BY FACULTY, THAILAND, MID-1960s

Faculty	Cost Per Bachelor (in baht)
Agriculture and Husbandry	34,800
Engineering	20,700
Science	81,200
Medicine	169,000
Social and Political Science	14,100
Law	7,400
Accounting	12,600
Economics	17,400

Source: Reiff (1972), pp. 262-3.

Table C.7: COST PER STUDENT IN THAILAND, 1969
(in baht)

Subject	Recurrent	Capital
Social Sciences	1,586	797
Education	4,745	5,015
Humanities	6,349	2,368
Fine Arts	4,926	2,313
Natural Sciences	10,917	5,933
Engineering	6,620	1,136
Agriculture	6,971	6,070
Medicine	14,717	26,260

Source: Blaug (1971), p. 4-9.

Table C.8: THE DIRECT COST PER STUDENT IN HIGHER EDUCATION IN IRAN, 1964
(in rials per year)

	Social Cost			Private
Subject	Recurrent	Capital	Total	Cost[1]
Humanities	37,710	25,093	63,803	9,500
Economics	36,604	25,093	62,697	9,500
Science	86,746	39,724	127,470	11,500
Agriculture	151,180	39,724	191,904	11,500
Engineering	100,333	39,724	142,057	12,500

Note: 1/ Refers to books and tuition.

Source: Rahmani (1970), p. 19.

Table C.9: CAPITAL COST PER STUDENT PLACE IN SELECTED ASIAN COUNTRIES
(in 1964 US dollars)

Educational Level	Area Per Student Place (in M^2)	Building Cost Per Place	Equipment Cost Per Place	Total Capital Cost Per Place
Primary	1.3	35	11	46
Lower Secondary				
General	3.0	120	66	186
Vocational	4.0	160	101	261
Upper Secondary				
General	3.0	120	66	186
Technical	5.0	200	146	346
University				
Science and Related	16.0	960	1,120	2,080
Arts and Related	6.0	360	300	660

Note: Figures are averages for Afghanistan, Laos, Nepal, Burma, Cambodia, India, Indonesia, Iran, Mongolia, Pakistan, Rep. of Vietnam, Ceylon, Rep. of China, Rep. of Korea, Malaysia, Philippines, Singapore and Thailand.

Source: Auerhan and Solomon (1972), p. 319.

Table C.10: THE SOCIAL AND PRIVATE DIRECT COST OF EDUCATION IN INDIA, 1961
(in Rs per year)

Educational Level	Cost Per Student	
	Social	Private
Primary	65	13
Secondary	330	154
B.A., B. Sc., B. Comm.	1,142	622
Engineering	1,842	363
M.A.	1,607	596
M. Sc.	3,460	596

Source: Blaug et al (1969), Table 8.12.

Table C.11: THE COST OF EDUCATION IN MALAYSIA 1967
(in M$ per year)

Educational Level	Total Cost	Thereof Income Foregone
Primary	372	0
Forms I-II	524	0
Forms III-IV	775	194
Sixth Form	1,268	426
University	5,490	1,070
Engineering	6,988	1,148
Agriculture	6,988	1,148
Medicine	8,166	1,226
All Other	4,670	1,070

Source: Hoerr (1973), p. 257.

Table C.12: COST PER STUDENT PLACE IN MALAYSIA, 1977

Educational Level and Type	Recurrent Cost (US$)	Student/ Teacher Ratio	Area Per Student Place[1] (sq ft)
Secondary Schools	132	28	55
Technical	350	18	79
Vocational	369	13	100
Agricultural	2,032	5	151

Note: [1] Refers to academic and communal facilities.

Source: World Bank estimates.

Table C.13: AVERAGE COST PER STUDENT BY FACULTY, UNIVERSITY OF ZAMBIA, 1973 (in kwacha)

Faculty	Cost Per Student
Social Sciences and Humanities	724
Law	1,073
Agriculture	2,962
Engineering	1,610
Medicine	4,096

Source: Sanyal et al (1976), p. 113.

Table C.14: ACTUAL CAPITAL COST PER STUDENT PLACE, ZAMBIA, MID-1970s

Subject	Capital Cost Per Student (US$)
Education	2,723
Engineering	4,812
Agriculture	14,861

Source: World Bank estimates.

Table C.15: COST PER STUDENT IN PAPUA NEW GUINEA, 1976
(in K)

	Cost Per Student	
Educational Level	Recurrent	Capital
Primary	96	93
High School	220	689
Vocational and Skulanka	245	n.a.
National High School	631	3,500
Technical	706	n.a.
Teachers College	1,125	700

Source: World Bank estimates.

Table C.16: COST PER STUDENT IN THE PHILIPPINES, 1966

Educational Level	Public	Private
Primary	113	100
Secondary		
General	335	134
Vocational	442	381
College, Normal	355	288
College, Other	1,361	294

Note: Cost figures include capital costs.

Source: Philippines Ministry of Education, (1970), p. 49.

Table C.17: THE INCREMENTAL CAPITAL COST PER STUDENT PLACE IN THE PHILIPPINES, 1976

Institution and Faculty	Incremental Capacity (Number of Extra Students)	Capital Cost Per Extra Student (US$)
University of the Philippines, Los Banos		
College of Forestry	475	6,737
Department of Animal Science	410	10,731
College of Vet. Medicine	140	27,857
Visayas State College of Agriculture	550	23,091

Note: Capital cost refers mainly to site development, building, furniture and technical assistance.

Source: World Bank estimates.

Table C.18: INCREMENTAL CAPITAL COST PER NEW STUDENT PLACE IN ETHIOPIA, 1975

Educational Level	New Student Places	Capital Cost Per Student (US$)
Primary	110,000	68
Secondary		
Junior	3,600	396
Senior	2,560	572
Forest Ranger Training Center	40	4,350
Health Assistants Training Center	360	3,486
Social Science Center	720	2,741

Source: World Bank estimates.

Table C.19: CAPITAL EXPENDITURE PER STUDENT PLACE IN INDONESIA, 1971
(in Rps)

Educational Level	Capital Cost Per Student
Primary	800
Lower Secondary	
General	950
Other	1,900
Upper Secondary	
General	1,300
Other	2,550
University	
Arts	11,000
Sciences	17,500

Source: World Bank estimates.

Table C.20: THE COST PER STUDENT BY EDUCATIONAL LEVEL IN INDONESIA, 1974
(in US$)

	Cost Per Student	
Educational Level	Recurrent	Capital
Primary	19	118
Secondary		
Lower	58	930
Upper	106	1,127
Higher	156	4,300

Note: Data are 1971-75 averages and refer to the economics faculty in all State Universities.

Source: World Bank estimates.

Table C.21: RECURRENT COST PER STUDENT IN THE HONDURAS, 1972 (in L)

Educational Level	Cost Per Student
Primary	83
Secondary	
General	416
Vocational	2,996

Source: World Bank estimates.

Table C.22: UNIVERSITY ENROLLMENT AND RECURRENT EXPENDITURE PER STUDENT IN SINGAPORE, 1976, 1978

	Enrollment		(Cost Per Student (S$)	
Subject	1976	1978	1976	1978
Accountancy	1,437	1,378	2,036	2,558
Architecture	462	518	5,492	6,040
Engineering	1,133	1,319	4,771	5,038
All subjects	3,032	3,215	3,585	4,136

Source: World Bank estimates.

Table C.23: CAPITAL EXPENDITURE PER STUDENT, SINGAPORE, MID-1970s (US$)

Faculty	Cost Per Student
Accountancy	2,391
Architecture	5,889
Engineering	8,885

Source: World Bank estimates.

Table C.24: THE CAPITAL COST PER STUDENT PLACE IN ALGERIA, 1978
(US$)

Institution	Cost Per Student
National Institute of Mechanical Engineering	
Setif	30,833
Tiaret	34,583
Institute for Vocational Teacher Training	17,300
Technical Teacher Training College	39,000

Source: World Bank estimates.

Table C.25: THE RECURRENT COST PER STUDENT OF POST-SECONDARY NON-UNIVERSITY INSTITUTIONS IN ALGERIA, 1973
(US$)

Institution	Cost Per Student
Algerian Petroleum Institute)	3,281
Institute of Mining and Metallurgy)	
Institute of Agricultural Technology)	

Source: World Bank estimates.

Table C.26: RECURRENT AND CAPITAL COST PER STUDENT PLACE, BANGLADESH, 1968
(in Rps)

	Cost Per Student	
Educational Level	Capital	Recurrent
Primary	180	19
Secondary General	329	76
College	1,948	152
Primary Training Institute	3,795	936
Junior Training Institute	5,805	788
Technical Institute	6,019	1,650
Polytechnic Institute	6,919	998
Engineering College	24,004	2,618

Sources: World Bank estimates.

Table C.27: CAPITAL AND RECURRENT COST PER STUDENT,
PAKISTAN, 1975
(in PRs)

Educational Level	Capital Cost	Recurrent Cost
Primary	38	100
Secondary	270	350
Technical, Diploma	2,000	2,000
Technical, Degree	5,000	4,500
College	800	1,000
University	15,000	5,000

Source: UNDP (1977), p. 216.

Table C.28: RECURRENT COST PER STUDENT IN SIERRA LEONE, 1975
(in Le)

Educational Level	Cost Per Student
Secondary General	99
Secondary Technical	348

Source: World Bank estimates.

Table C.29: RECURRENT COST PER STUDENT IN KOREA, 1976
(in US$)

Educational Level	Cost Per Student
Secondary School	
Technical	162
Agricultural	142
Commercial	172
Higher, Non-University	
Technical	277
Agricultural	161

Source: World Bank estimates.

Table C.30: THE INCREMENTAL CAPITAL COST PER STUDENT PLACE IN KOREA, 1978

Education	Incremental Capacity (Number of Students)	Capital Cost Per Extra Student (US$)
Engineering		
Undergraduate	16,750	3,000
Graduate	236	10,000

Source: Korea Ministry of Education (1979), pp. 65-66.

Table C.31: MEDIAN CAPITAL COST PER STUDENT PLACE IN WORLD BANK EDUCATION PROJECTS, 1974-1977 (in 1977 US$)

Educational Level and Curriculum	Cost Per Student Place
Non-Formal	
Basic	485
Vocational	5,163
Primary	223
Secondary	
General	1,570
Vocational	2,094
Post-Secondary, Non-University	
Teacher Training	2,044
Vocational	3,100
University	13,766

Note: Cost refers to construction, furniture and equipment expenditures.

Source: World Bank estimates.

Table C.32: PUBLIC EXPENDITURE PER STUDENT IN NORWAY, 1966
(in NKr)

Faculty	Expenditure Per Student
Law	2,600
Arts	3,800
Social Sciences	4,300
Sciences	9,900
Medicine	25,500
Dentistry	26,300

Source: Aarrestad (1972), p. 277.

Table C.33: DIRECT ANNUAL COST PER STUDENT IN FRANCE, 1975

Educational Level	Cost Per Student (in francs)	Thereof Personnel Cost (percentage)
Primary	2,285	74
Secondary, 1st cycle	4,650	65
Secondary, 2nd cycle, General	7,800	74
" " " , Technical	9,000	74
Higher, Law and Economics	4,300	30
" , Humanities	5,000	38
" , Sciences	11,500	38
" , Engineering	19,000	n.a.

Note: The cost of higher education excludes research expenditures.

Source: Eicher and Lévy-Garboua (1979), p. 245.

Table C.34: ANNUAL COST PER STUDENT PLACE BY SUBJECT,
UNITED KINGDOM, 1968
(in £)

	First Degree		Masters & Doctorate	
Subject	Recurrent	Capital	Recurrent	Capital
Arts	413	1,702	630	2,034
Social Science	334	1,702		
Science	492	3,136	1,104	5,516
Technology	662	3,757		
All Subjects	459	2,408	905	3,538

Note: Recurrent cost excludes research expenditures. Capital cost is amortized on an annual basis.

Source: Morris (1973a), Table 4.

Table C.35: AVERAGE AND MARGINAL COST BY SUBJECT,
UNITED KINGDOM, 1969
(in £)

Subject	Average Cost	Marginal Cost
Arts	326	192
Social Sciences	309	168
Mathematics	324	141
Physical Sciences	629	387
Biological Sciences	760	458
Engineering	693	461

Note: Costs are predicted by a multiplicative cost function.

Source: Verry and Davies (1976), p. 128.

Table C.36: ESTIMATED AVERAGE AND MARGINAL COST PER STUDENT UNDER ECONOMIES OF SCALE, UNIVERSITY OF BRADFORD, UNITED KINGDOM, 1972 (in 1967 £)

Subject	Cost Per Student Average	Cost Per Student Marginal
Chemical Engineering	1,615	1,173
Civil Engineering	1,682	1,167
Pharmacy	2,051	1,160
Color Chemistry	2,016	1,241
Materials Science	2,684	2,248
Physics	2,524	2,031
Biology	2,070	1,605
Social Sciences	1,150	989
All Subjects	1,864	1,330

Source: Bottomley and Dunworth (1974), Table 1, columns (12) and (15).

Table C.37: AVERAGE COST PER STUDENT BY SUBJECT, UNIVERSITY OF BRADFORD, UK, ACTUAL 1967, 1970 AND PROJECTED 1982 (in constant 1967 £)

Subject	1967	1970	1982
Technology	2,671	2,658	1/
Chemical engineering	2,350	2,189	1,615
Civil engineering	2,265	2,133	1,682
Electrical engineering	2,875	3,102	
Mechanical engineering	3,410	3,468	
Textile technology	2,440	2,619	
Science	2,961	2,822	
Pharmacy	2,719	2,826	2,051
Ophthalmic optics	3,046	2,552	
Chemistry	3,225	3,336	
Color chemistry	3,591	3,354	2,016
Materials Science	3,144	3,217	2,684
Physics	3,144	3,214	2,524
Biology	3,393	3,678	2,070
Mathematics	2,633	1,892	
Statistics	2,044	1,456	
Social Studies	1,684	1,482	
Social Sciences	1,791	1,361	1,150
Management	1,590	1,740	
Applied social studies	1,791	1,629	
All Subjects	2,405	2,321	1,864

Note: 1/ Not available.

Source: Bottomley and Dunworth (1974), Table 1, Columns (2), (8) and (12).

Table C.38: COST PER STUDENT BY LEVEL OF EDUCATION IN PORTUGAL (in current Escudos)

Educational Level	1973	1974	1975	1976	1977	1978	1979
Primary	1,673	2,190	4,416	5,321	7,288	8,226	10,374
Preparatory	5,331	6,337	10,969	12,141	15,190	13,191	17,658
Secondary	5,006	6,252	9,598	10,071	13,121	15,329	17,811
Teacher Training	n.a.	n.a.	14,960	18,380	36,650	n.a.	n.a.
Non-university Post-secondary	n.a.	n.a.	5,885	11,802	20,900	30,231	42,274
University	10,420	15,760	22,400	25,080	33,510	n.a.	n.a.

Note: Cost refers only to recurrent expenditure.
n.a. = not available.

Source: Based on information supplied by the Ministry of Education, Directorate of Financial Services and Emilia Sao Pedro and Varela (1978).

Table C.39: ENROLLMENT AND COST PER STUDENT AT THE "NEW" UNIVERSITIES, PORTUGAL

Year	Number of Students	Cost Per Student (in escudos)	Real Cost Per Student (1975 = 100)
1975	389	323,751	100
1976	1,340	136,013	
1977	2,387	213,612	
1978	4,725	106,507	19
1979	5,789	124,115	n.a.

Note: The "new" universities instituted in the early 1970s are:

Instituto Universitario Açores (agriculture, administration)
" " Evora (agriculture)
" " Aveiro (engineering)
Universidad Minho (engineering and teacher training)
Instituto Polytechnico de Vila Real (agriculture)
Instituto Polytechnico de Covilhã (engineering, textiles)
Universidad Nova de Lisboa (social sciences, technology and medicine)
School of Music of Madeira
Instituto de Artes Plasticâs
School of Dentistry of Lisboa and Porto

Source: As in Table C.38.

Table C.40: ENROLLMENT AND COST PER STUDENT AT THE UNIVERSITY OF COIMBRA, PORTUGAL

Year	Number of Students	Cost Per Student (in escudos)
1975	8,583	30,830
1976	9,861	29,459
1977	11,825	27,953
1978	9,470	39,495
1979	9,648	46,498

Note: Cost refers to recurrent expenditure. The University of Coimbra offers mainly classical subjects.

Source: Estimates based on information supplied by the Ministry of Education, Directorate of Financial Services.

Table C.41: ENROLLMENT AND COST PER STUDENT AT THE UNIVERSITY OF LISBOA, PORTUGAL

Year	Number of Students	Cost Per Student (in escudos)
1975	17,493	17,125
1976	21,928	16,786
1977	20,678	20,601
1978	22,986	16,640
1979	19,112	26,177

Note: This branch of the University of Lisboa offers mainly classical subjects.

Source: As in Table C.38.

Table C.42: ENROLLMENT AND COST PER STUDENT AT THE UNIVERSITY OF PORTO, PORTUGAL

Year	Number of Students	Cost Per Student (in escudos)
1975	10,664	19,380
1976	14,682	22,885
1977	16,248	21,623
1978	13,362	30,067
1979	13,857	37,637

Source and Note: As in Table C.38.

Table C.43: ENROLLMENT AND COST PER STUDENT AT THE TECHNICAL UNIVERSITY OF LISBOA, PORTUGAL

Year	Number of Students	Cost Per Student (in escudos)
1975	8,252	28,510
1976	12,529	22,982
1977	15,077	24,496
1978	14,015	23,632
1979	11,473	37,505

Source and Note: As in Table C.38.

Table D.1: MONTHLY SALARY BY EDUCATIONAL QUALIFICATION, ZAMBIA, 1974
(in K)

Educational Qualification	Monthly Salary
Diploma[1/]	238
B.A., B. Sc.	327
M.A., M. Sc.	343
Ph.D.	393

Note: 1/ Weighted average, one- to three-year diploma.

Source: Sanyal, et al (1976), p. 354.

Table D.2: AVERAGE DAILY EARNINGS BY EDUCATIONAL LEVEL, PAKISTAN, 1975
(in PRs)

Educational Level	Employees	Self-Employed
Illiterate	11.8	15.5
Primary or less	12.4	16.8
Middle School	12.8	17.3
Matriculation & Intermediate	14.3	18.6
Degree	17.3	20.7

Note: Based on a survey of 12,840 non-farm employees and self-employed persons.

Source: UNDP (1977), p. 83.

Table D.3: INCREMENTAL EARNINGS POTENTIAL BY EDUCATIONAL LEVEL, PAKISTAN, 1975
(percentage)

Educational Level	Employees	Self-Employed
Literacy	6.9	9.9
Middle School	3.3	2.9
Matriculation	16.5	8.9
Degree	23.9	17.9

Source: UNDP (1977), p. 94.

Table D.4: AVERAGE EARNINGS OF THE UNIVERSITY OF PHILIPPINES GRADUATES

Field of Specialization	Average Earnings (pesos per month)	
	All Fields	Own Field
Business administration	413	522
Liberal arts	375	375
Law	660	650
Civil engineering	444	444
Physical science	342	357
Agriculture	279	291
Mechanical engineering	525	521
Chemical engineering	451	386

Note: Data refer to 1969.

Source: ILO (1974), pp. 638-9.

Table D.5: EXPECTED AND ACTUAL MONTHLY STARTING SALARIES BY FACULTY, ZAMBIA, 1974 (in K)

Faculty	Expected Starting Salary	Actual Salary
Law	346	390
Business	253	312
Social Sciences, Humanities	252	295
Engineering, Technology	210	249
Agriculture	221	226
Natural Sciences	231	266
Medicine	206	257

Source: Sanyal et al (1976), pp. 325, 354.

Table D.6: PUBLIC SECTOR STARTING SALARIES IN MALAYSIA, 1979 (in M$)

Subject	Salary
Arts	865
Law	925
Accountancy	1,165
Actuary	1,225
Science	865
Agriculture	925
Engineering	985
Architecture	1,105
Medicine	1,225
Dentistry	1,105

Source: Federation of Malaysia (1975), Volumes I and II.

Table D.7: MID-CAREER ANNUAL EARNINGS IN IRAN, 1964 (in rials)

Educational Level and Subject	Earnings at Age 35
Secondary School Diploma	136,080
Higher Education	
Humanities	276,480
Economics	318,720
Science	318,720
Agriculture	364,800
Engineering	410,880

Source: Rahmani (1970), p. 15.

Table D.8: STARTING AND MID-CAREER SALARIES BY FACULTY, TANZANIA, 1974
(shillings/month)
(000)

Faculty	Starting Salary	Mid-Career Salary	Growth Ratio 1/
Arts	1,188	1,786	1.49
Law	1,235	1,854	1.50
Science	1,307	1,851	1.42
Agriculture	1,379	1,927	1.40
Engineering	1,580	2,151	1.36
Medicine	1,853	2,393	1.29

1/ Mid-career to starting salary ratio.
Source: Sanyal and Kinunda (1977), p. 264.

Table D.9: PUBLIC SECTOR STARTING SALARIES IN TANZANIA, 1974
(in 000 sh.)

Subject	Monthly Salary
Teacher (arts)	1,475
Sciences	1,530
Economics	1,530
Agriculture	1,595
Engineering	1,865
Doctor of Medicine	2,110

Source: Sanyal and Kinunda (1977), p. 74.

Table D.10: EXPECTED SALARY AND DESIRABILITY OF SELECTED PROFESSIONS IN TANZANIA

Profession	Expected Monthly Salary (in 000 sh.)	Desirability Rank
Engineer	1,602	1
Social Scientist	1,369	2
Lawyer	1,458	3
Businessman	1,447	4
Agriculturist	1,384	5
Natural Scientist	1,301	6

Source: Sanyal and Kinunda (1977), p. 212.

Table D.11: PUBLIC SECTOR STARTING SALARIES IN THE SUDAN, 1974
(in LSd)

Post-secondary Course Duration	Annual Salary
2 years	300
3 years	340
4 years	400
5 years	478
arts or sciences	425
engineering	530
6 years (medicine)	560

Source: Sanyal et al (1975), p. 91.

Table D.12: MEAN ANNUAL EARNINGS BY DEGREE LEVEL AND SUBJECT, UNITED KINGDOM, 1967
(in £)

Subject	First Degree	Masters	Doctorate
Arts	2,651	2,539	2,860
Social Sciences	2,681		
Sciences	2,635	2,866	3,021
Technology	2,559		
All Subjects	2,547	2,736	2,995

Note: Data refer to males. Brackets mean a finer distinction is not available.

Source: Morris (1973a), Tables 2 and 3.

Table E.1: UNEMPLOYMENT RATES BY EDUCATIONAL LEVEL,
THE PHILIPPINES 1961 AND 1968
(percent)

Educational Level	Unemployment Rate 1961	 1968
No education	4.0	4.4
Grades I - IV	5.6	4.5
Grades V - VI	9.4	6.8
High School, 1 - 3 years	12.6	13.7
High School graduate	18.1	15.3
College, 1 - 3 years	18.7	17.4
College 4 + years	7.9	7.2
Overall	8.5	7.8

Source: ILO (1974), p. 309.

Table E.2: UNEMPLOYMENT RATES BY YEAR OF
GRADUATION, SINGAPORE, 1974

Year of Graduation	Unemployment Rate (percent)
1969	4.6
1970	9.0
1971	13.1
1972	13.1
1973	20.0

Note: Data refer to 11 vocational and technical institutes.

Source: Pang Eng Fong (1975), p. 14.

Table E.3: THE DISTRIBUTION OF THOSE UNEMPLOYED OVER ONE YEAR BY EDUCATIONAL LEVEL, SUDAN, 1974

Educational Level	Percentage
Less than Primary	30
Primary completed, but but less than Secondary	53
Secondary and above completed	18

Source: ILO, (1976), p. 412.

Table E.4: WAITING PERIOD BETWEEN GRADUATION AND FIRST JOB, SUDAN, 1974 (percentage)

Waiting Period	Engineer	Social Scientist	Lawyer
Less than 6 months	96	77	10
6 months - 12 months	4	14	60
1 year or over	0	9	30

Source: Sanyal et al (1975), p. 219.

Table E.5: ABSORPTION RATES OF THE UNIVERSITY OF PHILIPPINES GRADUATES

Field of Specialization	Absorption Rate	
	All Fields	Own Field
Business administration	.90	.60
Liberal arts	.95	.81
Law	1.00	1.00
Civil engineering	.75	.75
Physical science	1.00	.91
Agriculture	.64	.85
Mechanical engineering	.79	.67
Chemical engineering	.72	.48

Note: Data refer to 1969. Absorption rates are based on the previous five years' graduates.

Source: ILO (1974), pp. 638-9.

Table E.6: EMPLOYMENT STATUS OF UNIVERSITY GRADUATES, SINGAPORE, 1975
(percent)

Subject	Unemployment Rate	Graduates Searching More Than 3 Months	Employed by the Public Sector
Arts	9	81	68
Social Sciences	10	100	68
Business administration	5	88	33
Law	10	100	56
Accountancy	7	71	28
Estate management	0	0	60
Science	9	88	75
Architecture	0	0	86
Building science	0	0	100
Civil engineering	7	0	85
Electrical engineering	8	0	83
Mechanical engineering	0	0	50
Systems engineering	40	50	33
All subjects	13	75	55

Source: University of Singapore (1976), p. 4.

Table E.7: EMPLOYMENT STATUS OF UNIVERSITY GRADUATES, SINGAPORE, 1976
(percent)

Subject	Unemployment Rate	Graduates Searching More Than 3 Months	Employed by the Public Sector
Arts	12	100	77
Social sciences	2	100	65
Business administration	14	95	21
Law	6	0	63
Accountancy	18	100	12
Estate management	10	100	78
Science	17	88	82
Architecture	0	0	86
Building science	0	0	83
Civil engineering	0	0	92
Electrical engineering	18	75	83
Mechanical engineering	25	0	22
Systems engineering	17	100	20
All subjects	16	97	60

Source: University of Singapore (1976), p. 4.

Table E.8: GRADUATE EMPLOYMENT DATA, KOREA, 1975

Educational Level	Percent Unemployed or of Unknown Destination	Percent in "Relevant" Employment
Secondary School		
Technical	11	89
Agricultural	25	76
Commercial	25	85
Higher, Non-university		
Technical	14	88
Agricultural	35	81

Source: World Bank estimates.

Table E.9: UNEMPLOYMENT PLUS INACTIVITY RATE BY UNIVERSITY SUBJECT, KOREA, 1975

Subject	Unemployment Plus Inactivity Rate (percent)
Literature & Linguistics	46.9
Arts	58.8
Humanities	51.7
Social Sciences	42.9
Natural Sciences	50.3
Engineering	41.5
Medicine	31.6
Agriculture	45.8
University, All subjects	46.2

Source: Korea Ministry of Education (1975), Chapter 26.

Table E.10: UNEMPLOYMENT RATE OF JUNIOR VOCATIONAL COLLEGE GRADUATES IN KOREA, 1978

Subject	Unemployed as Percentage of Graduates
Technical	5
Other	19
All Subjects	11

Source: Yoon Tai Kim et al (1979), p. 14.

Table E.11: UNEMPLOYMENT RATES BY LEVEL AND TYPE OF EDUCATION, INDIA, 1961
(percentage)

Education	Unemployment Rate
Illiterate	1.6
Literate	2.7
Primary	4.8
Matriculate	5.9
Technical Diploma	3.2
Non-technical Diploma	7.7
Degree in Arts, Science or Commerce	3.3
Technical Degree	1.7
Engineering	1.5
Agriculture	1.1

Source: Blaug et al (1969), Table 3.15.

Table E.12: NUMBER OF UNEMPLOYED GRADUATES AS PERCENTAGE OF TOTAL NUMBER OF GRADUATES, SUDAN, 1973

Faculty	Unemployed Graduates	Graduates	Percentage Unemployed
Arts	49	150	32.7
Economics	66	167	39.5
Agriculture	3	38	7.9
Law	17	31	54.8
Sciences	29	94	30.9

Source: Sanyal et al (1975), p. 45.

Table E.13: THE INCIDENCE OF UNEMPLOYMENT IN INDIA, 1971
(percentage)

	M. Sc. in	
Age	Sciences	Agriculture
20-24	25.4	29.7
25-29	10.0	10.8
30-34	2.4	0.6
35-39	1.6	1.0
40-44	0.0	0.0
All Ages	7.6	7.0
Mean duration (in months)	16	11

Source: Eswara Prasad (1977), Tables 3 and 5.

Table F.1: UNIVERSITY WASTAGE RATES BY FACULTY, ZAMBIA, 1978
(percent)

Faculty	Wastage Rate
Humanities	19
Law	25
Education	28-39
Agriculture	17
Engineering	40
Natural Sciences	48

Source: World Bank estimates.

Table F.2: ACTUAL UTILIZATION AS PERCENT OF CAPACITY SIERRA LEONE, 1975
(percent)

School	Utilization
Freetown Technical Institute	49
Kenema Technical Institute	40
Kissy Trade Center	71
Magburaka Trade Center	58

Source: World Bank estimates.

Table F3: ACTUAL UTILIZATION AS PERCENT OF CAPACITY EL SALVADOR, 1975
(percent)

Secondary Education Option	Utilization
Science and Humanities	55
Industry	15
Commerce	16
Agriculture	12
Fisheries	2

Source: World Bank estimates.

Table F.4: OVER (+) OR UNDER (-) UTILIZATION RATES BY EDUCATIONAL LEVEL AND CURRICULUM TYPE
(percentage)

Education Level and Curriculum	Utilization Rate
University	
General Faculties	+40
Technical	-24
Agriculture	-27
Secondary	
General	+12
Vocational	-10

Note: Based on World Bank estimates in 42 countries.

Source: World Bank estimates.

Table F.5: ADMISSION RATIOS BY SUBJECT, SINGAPORE, 1977
(percent)

Subject	Admission Ratio[1/]
Arts and Social Sciences	54.4
Science	57.2
Medicine	46.3
Dentistry	54.5
Law	28.9
Business Administration	56.8
Accountancy	32.3
Architecture	29.1
Building and Estate Management	61.0
Engineering	59.1
Chemical Engineering	33.3
All subjects	51.2

Notes: 1/ Number of students admitted as a percentage of first choice applicants.

Source: World Bank estimates.

Table F.6: UNIVERSITY ADMISSIONS AND APPLICANTS IN INDONESIA

Applicants	9,207
Admissions	2,532
Admission Ratio	27.5%

Note: Data are 1971-75 averages and refer to the economics faculty in all state universities.

Source: World Bank estimates.

Table F.7: STUDENT ENROLLMENT BY FACULTY AT HOME AND ABROAD, SUDAN, 1974

	Students Enrolled	
Faculty	At Home[1/]	Abroad
Agriculture	736	631
Science	1,482	211
Engineering	819	625
Medical Sciences	1,286	1,356
Economics	1,050)	
Arts	821)	1,282
Law	158)	

Notes: 1/ Refers to the University of Khartoum.

Source: Based on Sanyal et al (1975), pp. 72 and 84.

Table F.8: THE COMPOSITION OF ARTS VS SCIENCE UNIVERSITY ENROLLMENT IN THE SUDAN, 1969-73

Year	No. of Students Arts	No. of Students Science	Arts as Percentage of Total
1969	2,956	1,496	66
1970	3,442	2,025	62
1971	3,534	2,004	64
1972	1,835	2,012	48
1973	2,423	2,126	53

Source: Sanyal et al (1975), p. 78.

Table F.9: THE COMPOSITION OF ARTS VS SCIENCE IN SIXTH FORM, TANZANIA, 1961-75

Year	Student Enrollment in Arts	Student Enrollment in Science	Arts as Percentage of Total
1961	88	98	47
1962	91	108	46
1963	194	111	57
1964	238	225	51
1965	259	344	43
1966	360	401	47
1967	357	457	44
1968	421	508	46
1969	482	725	34
1970	546	866	39
1971	540	847	39
1972	508	980	34
1973	548	1,049	34
1974	769	1,286	38
1975	516	1,438	26

Source: Sanyal et al (1977), p. 98.

Table G.1: THE RETURNS TO HIGHER EDUCATION IN THE PHILIPPINES BY SUBJECT, 1969

(percentage)

Subject	Rate of Return	
	Private	Social
Business and Commerce	14.0	10.5
Civil Engineering	15.0	8.0
Chemical Engineering	17.0	10.0
Mechanical Engineering	18.0	13.0
Liberal Arts	11.0	n.a.
Agriculture	5.0	<5.0
Law	18.0	15.0
Physical Science	8.5	n.a.

Note: Rates refer to the University of the Philippines and are unadjusted for ability.

Source: ILO (1974), p. 643, Table 162.

Table G.2: THE RETURNS TO HIGHER EDUCATION IN IRAN BY SUBJECT, 1964

Subject	Social	Private
Humanities	15.3	20.0
Economics	18.5	23.9
Science	14.2	23.6
Agriculture	13.8	27.4
Engineering	18.2	30.7

Note: Returns are before growth and ability adjustments.

Source: Rahmani (1970), pp. 19, 20.

Table G.3: THE PRIVATE RETURNS TO EDUCATION IN MALAYSIA, 1968
(percentage)

Education	Rate of Return
Primary	12.9
Forms I-II	21.1
Forms III-IV	18.9
Sixth Form	15.6
University	11.4
Engineering	13.4
Agriculture	9.8
Medicine	12.4
All other subjects	6.3

Source: Hoerr (1973), p. 273.

Table G.4: RATES OF RETURN TO INVESTMENT IN EDUCATION IN INDIA, 1961
(percentage)

	Rate or Return	
Education	Social	Private
Primary (vs illiterate)	20.2	24.7
Matriculate (vs middle)	16.1	18.4
First degree (vs matriculate)	12.7	14.3
Engineering (vs matriculate)	16.6	21.2

Source: Blaug et al (1969), Table 10.1.

Table G.5: SOCIAL RATES OF RETURN TO INVESTMENT IN
HIGHER EDUCATION IN NORWAY, 1966
(percentage)

Subject	Rate of Return
Arts, 1st Degree	4.3
Law, Private Employer	10.6
Economics	8.9
Business Administration	16.6
Science, 1st Degree	6.2
Medicine	3.1
Dentistry	2.6
Agricultural Science	2.2
Engineering, Private Industry	8.7

Source: Aarrestad, (1972), p. 4.

Table G.6: THE RETURNS TO GRADUATE EDUCATION IN CANADA, 1967
(percentage)

Subject	Rate of Return	
	Social	Private
Masters		
Business Administration	9.0	16.3
Engineering	2 0	4.5
Doctorate		
Engineering	-3.5	1.5
Mathematics	-5.5	.3

Note: The control group is a bachelor's degree.

Source: Dodge and Stager (1972), Table IV.

Table G.7: RATES OF RETURN TO INVESTMENT IN HIGHER EDUCATION BY SUBJECT, UNIVERSITY OF BRADFORD, UK, 1967
(percentage)

Subject	Rate of Return	
	Social	Private
Chemical Engineering	9.6	25.0
Civil Engineering	9.7	29.0
Electrical Engineering	6.0	19.5
Mechanical Engineering	5.0	19.5
Chemistry	6.5	22.5
Physics	7.5	24.0
Mathematics	7.5	23.5
Statistics	11.0	29.0
Social Sciences	10.0	32.5
All Subjects	8.1	24.5

Source: Bottomley and Dunworth (1974), Table 1, Columns (3) and (5).

Table G.8: SOCIAL RATES OF RETURN TO INVESTMENT IN HIGHER EDUCATION BY SUBJECT, UNITED KINGDOM, 1967 (percentage)

<table>
<tr><th>Subject</th><th>First Degree</th><th>Master's</th><th>Doctorate</th></tr>
<tr><td>Arts</td><td>13.5</td><td colspan="2" rowspan="2">1.0</td></tr>
<tr><td>Social Science</td><td>13.0</td></tr>
<tr><td>Science</td><td>11.0</td><td rowspan="2">4.2</td><td rowspan="2">2.0</td></tr>
<tr><td>Technology</td><td>11.4</td></tr>
<tr><td>All Subjects</td><td>12.1</td><td>1.9</td><td>2.6</td></tr>
</table>

Note: Data refers to males.

Source: Morris (1973a), Table 6, Column (1).

Table G.9: PRIVATE RATES OF RETURN TO HIGHER EDUCATION BY OCCUPATION, UNITED KINGDOM, 1967 (percentage)

Occupation	Rate of Return
Architect	13.4
Engineer	
Mechanical and Electrical	16.3
Civil	17.5
Medical Practitioner	16.8
Technologist	16.4
Scientist	15.3
Science and Technology (Manager)	20.4
Arts and Social Sciences (Manager)	19.4
Solicitor	19.9
Accountant	19.3

Note: Rates of return are relative to "A" level qualification.

Source: Morris (1973b), Tables 9 and 10.

Table G.10: PRIVATE RATES OF RETURN TO EDUCATION IN FRANCE, 1970 (percentage)

Educational Level	Rate of Return	
	Males	Females
Secondary, 1st cycle (vs elementary)	21.9	20.3
" , 2nd " (vs sec. 1st cycle)	10.7	9.7
Higher education, overall (vs Bac)	16.6	7.8
Master's overall (vs Bac)	13.3	n.a.
Law and Economics	16.7	n.a.
Sciences	12.3	n.a.

Source: Eicher and Lévy-Garboua (1979), pp. 117, 118.

Table G.11: SOCIAL RATES OF RETURN TO HIGHER EDUCATION BY SUBJECT IN SELECTED COUNTRIES (percent)

Subject	Sweden	Denmark	Belgium	Brazil
Economics	..	9.0	9.5	16.1
Business Administration	9.0	..	..	..
Law	9.5	10.0	6.0	17.4
Medicine	13.0	5.0	11.5	11.9
Dentistry	..	..	..	8.4
Engineering	7.5	8.0	..	17.3
Agronomy	..	..	..	5.2
Architecture	..	9.0	..	..
Pure Science	..	..	9.0	..
Applied Science	..	..	7.0	..

Note: .. = not available.

Source: Psacharopoulos (1973), p. 72.

Table H.1: RATE OF RETURN TO INVESTMENT IN PHYSICAL CAPITAL IN SELECTED COUNTRIES, 1978
(percentage)

Country	Rate of Return	Type of Project
Botswana	13	Road
Ethiopia	11	Highway
Madagascar	15	Highway
Uganda	10	Highway
Central African Empire	14	Highway
Central African Empire	-20	Highway Improvement
Congo	21	Highway
Ivory Coast	21	Highway
Niger	30	Highway Maintenance
Niger	13	Highway
Nigeria	23	Road
Senegal	4	Highway
Togo	19	Highway Maintenance
Papua New Guinea	36	Highway
Thailand	28	Highway
Brazil	36	Highway
Ecuador	10	Highway
Trinidad and Tobago	30	Highway
Congo	11	Railways
Mali	11	Railways
Senegal	23	Railways
India	13	Railways
Senegal	17	Airport
Karachi	20	Port
Average	17	Transportation
Madagascar	0	Beef, Cattle Development
Spain	13	Livestock Development
Madagascar	22	Irrigation
Colombia	2	Irrigation
Malawi	8	Land Development
Cameroon	16	Oil Palm I
Cameroon	14	Oil Palm II
Gambia	22	Agricultural Development
Ivory Coast	15	Palm Plantation
Trinidad and Tobago	0	Crownlands Development
Average	11	Agriculture
India	19	Fertilizer Expansion
Dominican Republic	15	Falconbridge
Ghana	9	Power
Bolivia	13	Power
Mexico	4	Power
Sierra Leone	7	Power

continued ...

Table H.1 - continued

Country	Rate of Return	Type of Project
Brazil	10	Hydroelectirc
Chile	17	Power
Colombia	13	Power Expansion
Ethiopia	14	Telecommunications
Indonesia	29	Telecommunications
India	19	Telecommunications
Nepal	15	Telecommunications
Pakistan	27	Telecommunications
Iran	31	Telecommunications
Ghana	9	Water Supply
Jamaica	8	Water Supply
Average	15	Industry & Public Utilities
Overall Average	14	Physical Capital

Note: Rate of return is at audit. Only point estimates are included.

Source: World Bank estimates.

Table H.2: AVERAGE RATES OF RETURN TO INVESTMENT IN PHYSICAL CAPITAL, 1975
(percent)

	Appraisal		Audit	
Economic Sector	Low	High	Low	High
Transportation				
Highways	13.1	16.9	11.9	16.7
Railways	15.3	-	16.0	-
Ports	21.0	-	27.0	-
Agriculture	20.3	-	13.5	-
Public Utilities				
Power	11.5	-	12.0	-

Source: World Bank estimates.

Table H.3: AVERAGE RATES OF RETURN TO INVESTMENT IN PHYSICAL CAPITAL, 1976
(percent)

Economic Sector	Appraisal Low	Appraisal High	Audit Low	Audit High
Transportation				
Highways	17.8	19.2	15.7	18.5
Railways	15.0	15.0	7.0	10.0
Ports	16.0	-	12.0	-
Agriculture	23.0	23.7	16.2	20.0
Public Utilities				
Telecommunications	17.0	-	22.0	-

Source: World Bank estimates.

Table H.4: AVERAGE RATES OF RETURN TO INVESTMENT IN PHYSICAL CAPITAL, 1977
(percent)

Economic Sector	Appraisal Low	Appraisal High	Audit Low	Audit High
Transportation				
Highways	13.0	13.3	13.9	14.0
Ports	13.0	-	19.5	-
Agriculture	18.8	19.8	16.7	18.4
Industry	14.2	-	18.3	-
Public Utilities				
Power	16.1	-	13.7	-
Water Supply	14.5	-	11.5	-

Source: World Bank estimates.

Table H.5: AVERAGE RATES OF RETURN TO INVESTMENT IN PHYSICAL CAPITAL, 1978
(percent)

	Appraisal		Audit	
Economic Sector	Low	High	Low	High
Transportation				
Highways	17.9	19.9	17.6	18.2
Railways	17.4	19.4	13.6	15.6
Ports	12.0	-	18.5	-
Others	26.0	-	32.0	-
Agriculture	16.7	16.8	13.1	14.3
Industry	18.0	-	17.0	-
Public Utilities				
Power	14.5	17.0	8.5	8.5
Telecommunications	17.7	-	22.5	-
Water Supply	20.5	23.5	8.5	8.5

Source: World Bank estimates.

Table H.6: SENSITIVITY OF THE RATE OF RETURN TO INVESTMENT IN TRACTOR PRODUCTION IN YUGOSLAVIA, 1978
(percentage)

Assumption	Rate of Return
Base Case:	12.0
Benefits	
+10%	27.0
+ 5%	19.6
- 5%	2.1
-10%	-4.4
Operating Costs	
+10%	-5.1
+ 5%	-2.3
- 5%	18.7
-10%	25.3

Source: World Bank estimates.

Table I.1: MONTHLY EARNINGS BY SECTOR OF EMPLOYMENT AND EDUCATIONAL LEVEL, BRAZIL, 1970
(in cruzeiros)

Educational Level	Public	Private
No Education	233	151
Primary	370	288
Secondary, 1st cycle	696	720
Secondary, 2nd cycle	989	1,261
University	2,236	2,704
Overall	682	386
(N)	(3,689)	(13,179)

Note: Data refer to male employees.

Source: Based on the Brazilian Census, 1 percent sample.

Table I.2: MONTHLY EARNINGS BY SECTOR OF EMPLOYMENT AND FIELD OF STUDY, MALE UNIVERSITY GRADUATES, BRAZIL, 1970
(in cruzeiros)

Field of Study	Public	Private
Administration	1,683	2,826
Agronomy	1,928	1,962
Architecture	2,286	2,815
Accounting	2,100	2,321
Economics	1,785	2,833
Management	2,437	2,906
Engineering	2,875	3,503
Medicine	2,995	3,739
All	2,295	2,768
(N)	(410)	(282)

Source: Based on the Brazilian Census, 1 percent sample.

Table I.3: MONTHLY SALARY BY EDUCATION AND SECTOR OF EMPLOYMENT, MALAYSIA, 1978 (in M$)

Education	Public	Private
Commercial Certificate	571	443
Technical Certificate	514	422
Technical Diploma	879	1,048
Commerce Professional Qualification	1,485	1,465
Arts	1,245	1,572
Social Sciences	1,211	1,572
Pure Science	1,138	1,978
Applied Science	1,015	1,730
Agricultural Science	1,113	1,800
Commerce	1,250	1,591
University, Overall	1,214	1,656
Post-graduate	1,401	2,128

Source: Based on Lee (1980).

Table I.4: MINCERIAN EARNINGS FUNCTIONS BY SECTOR OF EMPLOYMENT, BRAZIL

Variable	Public	Private
Constant Term	7.080	6.587
Years of Schooling, S	.149	.192
	(65.9)	(118.4)
Years of Experience, EX	.034	.049
	(9.0)	(22.8)
EX^2	-.0004	-.0007
	(6.3)	(20.3)
R^2	.568	.534
N	3,689	13,179

Note: Male employees. Dependent variable refers to the natural logarithm of annual earnings. Numbers in parenthesis are t-ratios.
Regression-implied rates of return:
Public sector - 15 percent
Private sector - 19 percent.

Source: Based on Brazilian Census, 1 percent sample.

Table I.5: PRIVATE RATES OF RETURN TO INVESTMENT IN EDUCATION IN MALAYSIA, 1978
(percent)

Educational Level	For Employees in the Public Sector	For Employees in the Private Sector
Upper Secondary (relative to lower sec.)	16.3	21.2
Sixth Form (relative to upper sec.)	13.5	16.0
College (relative to upper sec.)	16.7	37.7
University (relative to sixth form)	39.7	50.5
Post-graduate (relative to university)	.7	12.2

Source: Based on Lee (1980).